

# SAE *Journal*

Published Monthly by The Society of Automotive Engineers, Inc.

A. T. Colwell, President

David Beecroft, Treasurer

John A. C. Warner, Secretary and General Manager

Norman G. Shidle, Executive Editor



## About Authors

■ **H. L. KNUDSEN** (M '19) was engaged in the design and development of the Brons, or as it is called in this country, the HVID engine, from 1914 to 1922, in the capacity of chief engineer and designer for several HVID licensees. Since 1922, he has been chief engineer, Cummins Engine Co., and in the last few years has devoted considerable time to increasing diesel-engine capacity through supercharging.

■ Since World War I, when he was active in the U. S. Army Air Service, **R. M. HAZEN** (M '24) has been working with aircraft engines. In 1936, he became chief engineer, Allison Division of General Motors, where he is now in charge of the development of large liquid-cooled aircraft powerplants. For several years Mr. Hazen was employed by Fairchild as assistant chief engineer, where he was responsible for many of the high-output features of the Ranger engines.

■ **THOMAS A. BISSELL** (M '37), who has been technical editor of the SAE Journal since 1935, received his M.E. from Cornell in 1923. He had eight years of plant, production, and sales engineering experience before he began his editorial career on the staff of "Maintenance Engineering," a McGraw-Hill publication. Since then he has been doing technical editorial work. Recently Mr. Bissell's article on "Designing for Alternate Materials" which appeared in the July, 1941, SAE Journal, received an Award of Merit in the annual competition sponsored by Industrial Marketing for the best published research work initiated by a business paper.

■ **MILTON J. KITTLER** (M '30) has spent most of his active life in experi-

## CONTENTS NOVEMBER 1941

The Automobile Industry Has Two Jobs Now	19
Defense in Pictures	20
Defense Impact on Industry	25
1942 Car Models Illustrated	30

## TRANSACTIONS SECTION

1942 Car Design Trends	Thomas A. Bissell	465
Mechanical Supercharging of Diesel Engines	H. L. Knudsen	481
The Allison Aircraft-Engine Development	R. M. Hazen	488
Design of Aircoops for Aircraft Carburetors	M. J. Kittler	501
Thomas J. Little, Jr.—Obituary		34
Section Chairmen for 1941-1942		36
News of the Society		38
SAE National Tractor Meeting		38
SAE Coming Events		47
About SAE Members		48
New Members Qualified		51
Applications Received		54

mental and development work on all types of carburetors, including automobile, truck, marine, and aircraft models. As chief engineer, Aircraft Division,

Holley Carburetor Co., he is today devoting his efforts exclusively to the design and improvement of the aircraft carburetor.

C. B. Whittelsey, Jr., Business Manager,  
29 West 39th St., New York, N. Y.

E. L. Carroll, Eastern Advertising Manager,  
29 West 39th St., New York, N. Y.

A. J. Underwood, Western Advertising Manager,  
2-136 General Motors Bldg., Detroit, Mich.



## Automotive America is showing the world some *real* harmonizing!

REMEMBER the old-time barbershop quartette? (Man, that was America!) Remember how Doc or Joe had to set the pitch before the boys could get going?

The grim "theme song" today is not "Sweet Adeline," but with the same old-fashioned close harmony, American industry has hit its keynote, and the result is mighty pleasing to the ear!

And in the big American Job today, it isn't all flags and drums, nor guns and tanks and planes. Equally vital is TRANSPORTATION . . . wheels that must be kept rolling.

Whether we build or sell or service America's motor cars and trucks and buses, it's a privilege—an honor—and a grave responsibility for each of us to harmonize our efforts with the others.

As the pace increases—the need for more vehicles and repairs for the old ones is a battle-front that is real and vital for final success.

On this front Bendix is at your service . . . past record and present accomplishment speak for themselves as to our ability and spirit . . . so, as we often say . . .

*Call on Bendix.*

# « Bendix Products »

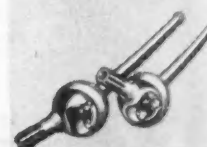
BENDIX PRODUCTS DIVISION OF BENDIX AVIATION CORPORATION  
SOUTH BEND, INDIANA. In Canada: BENDIX-ECLIPSE OF CANADA, LTD., WINDSOR, ONTARIO



Bendix B-K  
Power Braking



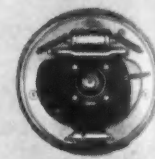
The Stromberg  
Carburetor



Bendix-Weiss Constant  
Velocity Universal Joint



Bendix Finger-Tip  
Gear Control



The Bendix  
Brake

The

# Automobile Industry

has TWO JOBS NOW—

## ■ *Automobiles*

1942 MODELS represent automobile engineers' answer to growing demands for individual transportation as the United States goes "all out" for defense. They meet government requirements for use of far less nickel, copper, zinc, chromium, tin, and other scarce materials. They offer the buyer everything in safety, comfort, and reliability, that years of consistent design progress have taught him to expect.

The detailed factual story of the 1942 passenger car models is a record of changes, refinements, and designing ingenuity seldom, if ever, surpassed. It covers sixteen full pages in this issue. To find it—

**(TURN TO p. 465, please)**

## ■ *National Defense*

WORDS AND PICTURES tell a woefully inadequate story of the automobile industry's attack on its national defense job.

The dogged determination to do the impossible—quickly . . . the swift application of unsurpassed managerial abilities to entirely new mass production projects . . . the engineering ingenuity which is perfecting military designs and developing devices capable of almost unbelievable feats of mechanized warfare . . . none of these things show clearly in words and pictures. But they are the stuff of which dictator defeats are made.

A very small fraction of the vast defense projects in which the automobile industry already is engaged is illustrated in the pages which follow immediately.

**(TURN TO p. 20, please)**



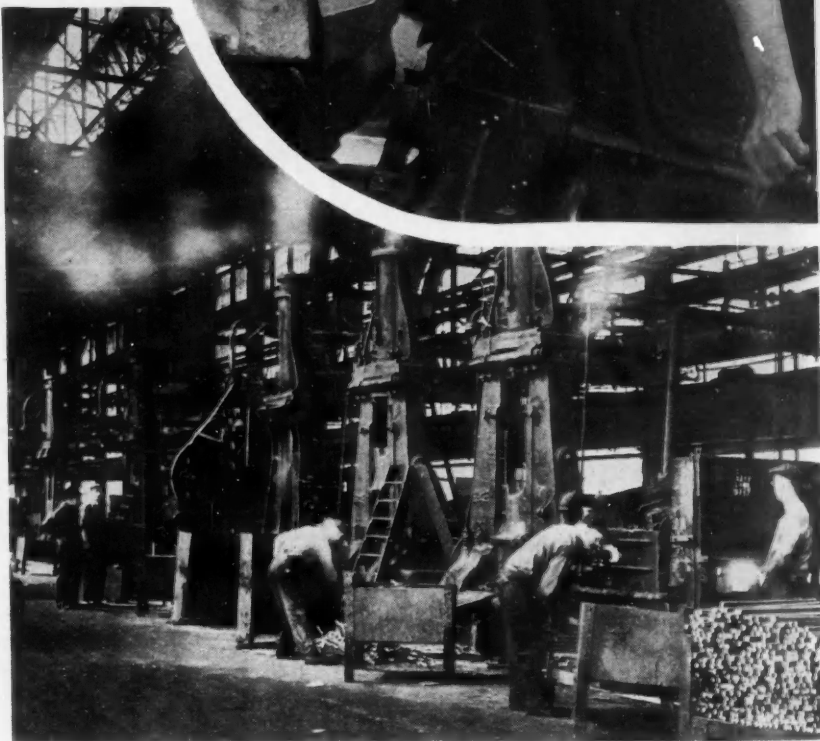


**A**ROUND automotive MEN and MACHINES whirls America's ever-expanding defense program. This transcending effort calls for superlative design and manufacturing ingenuity, demands unparalleled production capacities, long nerve-racking hours. Here are a few glimpses from the "automotive front" — foundation of national defense.

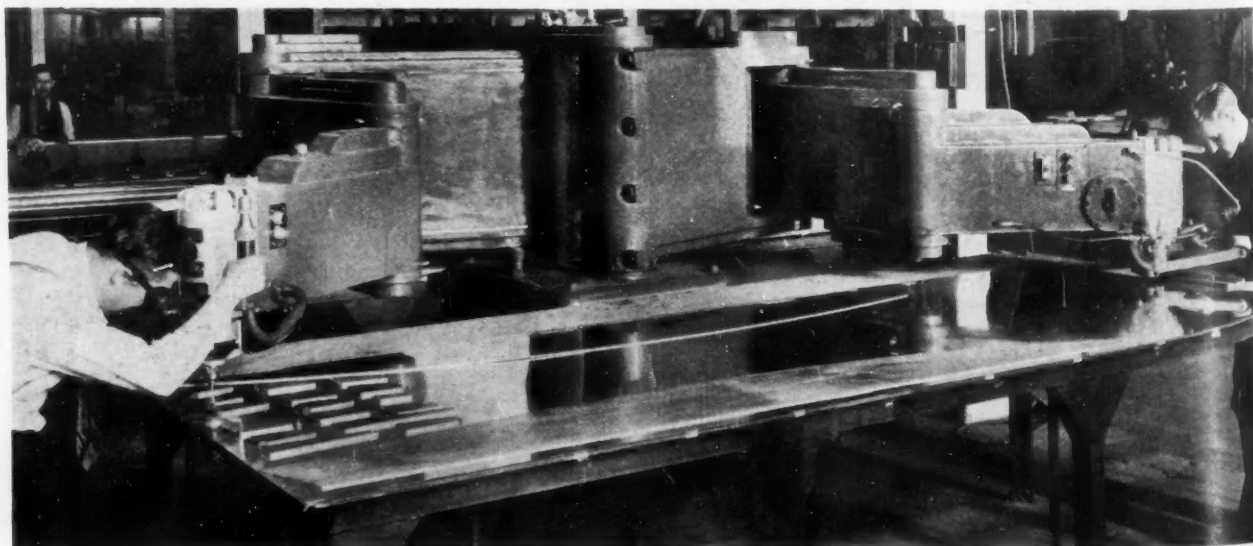
**PRECISION-TRAINED**, this precision grinding expert at Studebaker is getting the "feel" of Wright aircraft engine parts. Three new plants already completed and existing truck facilities of the company will contribute a big volume of defense goods (upper right)



**THUNDEROUS SYMPHONY**—Proving "It CAN be done" in the Willys-Overland plant; forging breech housings and gun recoil cylinders, while another bank of huge steam hammers shapes parts for Army reconnaissance cars. Willys defense schedule includes: "Blitz Buggies," forgings for aircraft and tank tracks, powder hoists for U. S. Navy



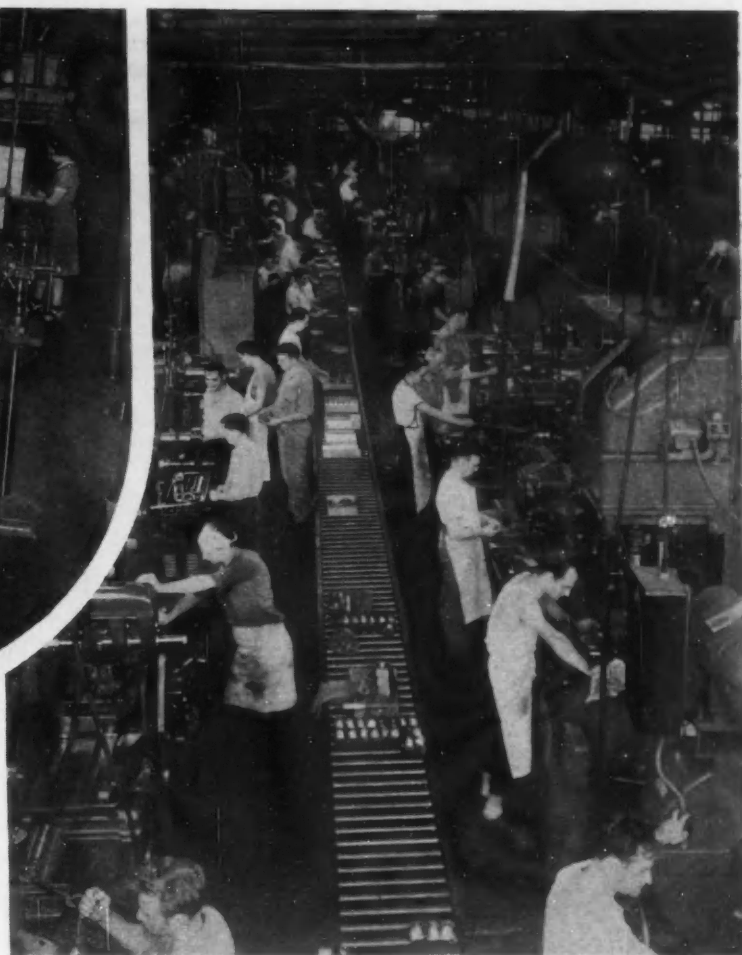
**NEW TECHNIQUES** mastered, experienced automobile makers in the Hudson Aircraft Division are routing and pre-drilling a stack of airplane sheets (below). Among units in production for defense in Hudson plants are bomb components, aircraft engine parts, gun mounts and fire-control equipment. Hudson's Aircraft Division is in the tooling stage for quantity production of rear fuselage sections for Martin B-26 bombers





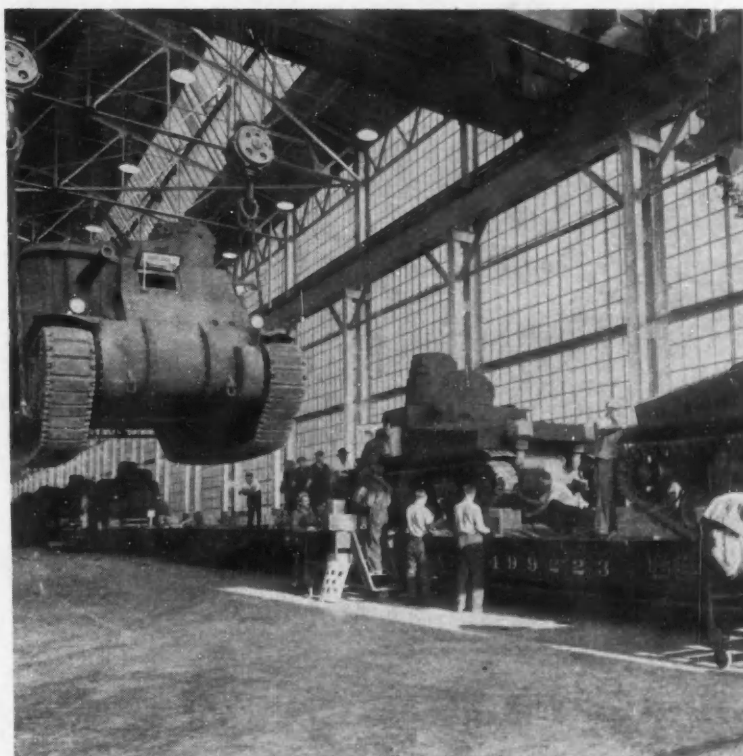


**WOMEN** inspectors checking cartridge cases (above) — one of a large list of defense products now in production in more than 60 General Motors operating units, representing every GM manufacturing division. GM has a heavy armament schedule which includes: 20-mm M-2 Hispano-Suiza aircraft wing cannon; 20-mm Oerlikon rapid-fire anti-aircraft guns for Navy; 75 to 105-mm shells; gun mounts, and many other national defense products



**MASTERS** of fine machining, Packard workers are finishing bearing blocks for the famed Rolls-Royce aircraft engine, a part of this company's defense assignment (upper right)

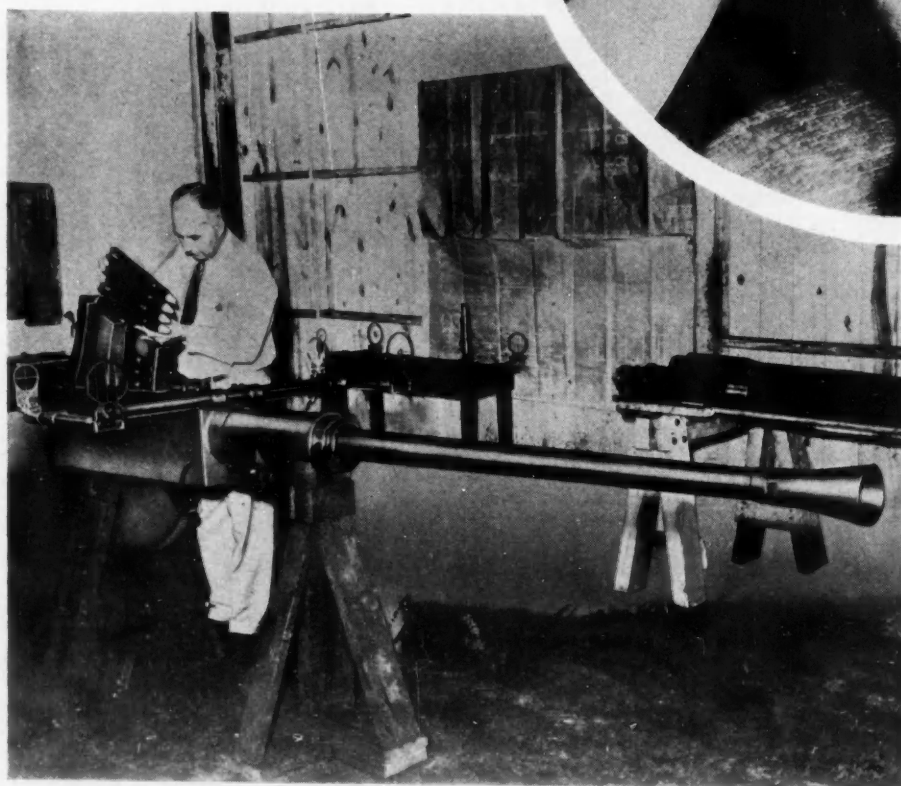
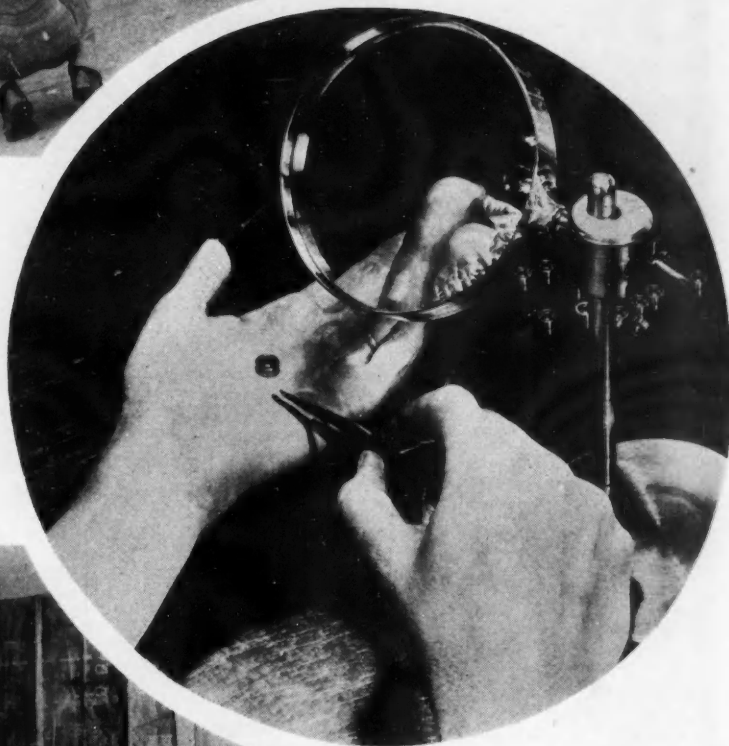
**SWINGING** 28-ton M-3 medium tanks on to flat cars from one of three production lines in Chrysler's \$20,000,000 tank arsenal. Tank engines and Army trucks are included in the scores of other Chrysler military products on order





**SUDDEN DEATH** being unloaded from a Ford bomb truck is symbolic of turning a huge peace-time industry into the arsenal of the democracies. "Blitz Buggies," Army reconnaissance cars, and a tremendous aircraft and aero engine program are parts of Ford's defense participation

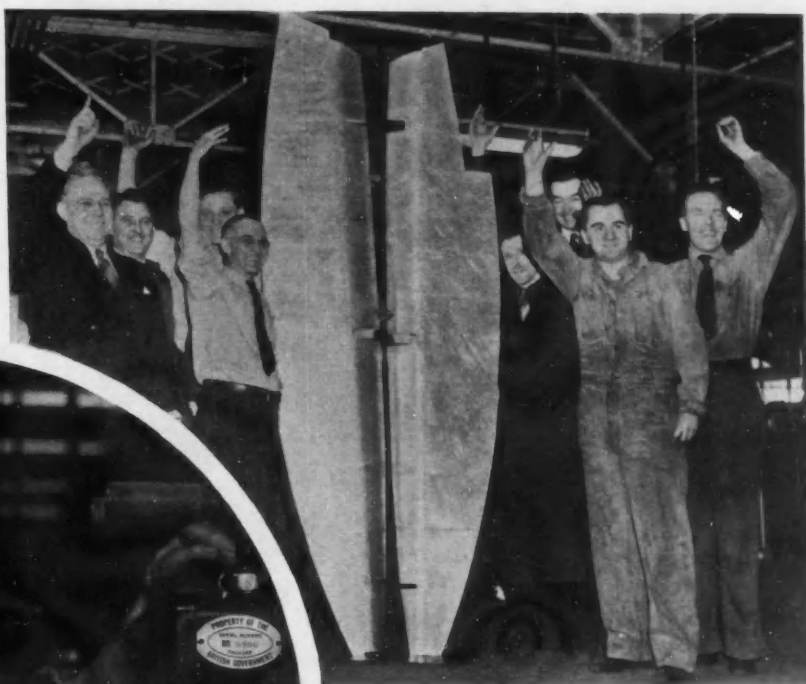
**INNOVATIONS** are the "order of the day" in General Motors factories. On the right is a minute ball bearing for aircraft instruments, a tiny but important part of the complicated defense program undertaken by the auto industry in the interest of defense



**FOUR HUNDRED** automobile machine tools were "drafted" by Chrysler to produce these 500-part Bofors rapid-fire "ack ack" guns. Other Chrysler divisions (Dodge, DeSoto, Chrysler) are pushing production on parts for Martin medium bombers

EIGHT CHEERS as the first airplane aileron comes off the Hudson Aircraft Division production line (right)

SHOP ALLIES—American (rectangular name plate) and British machine tools stand shoulder to shoulder in the Packard Rolls-Royce plant (below)



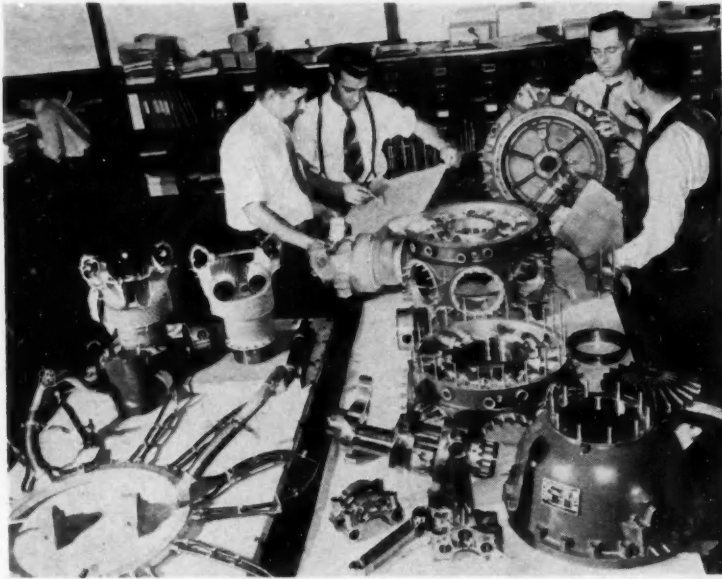
AUTO MACHINISTS turning out airplane propeller hubs in a General Motors plant, converting their training on accurate automobile parts to air defense (right center). Buick and Allison divisions are at work on Pratt & Whitney and Allison aircraft engines, respectively, with other GM satellites supplying engine parts



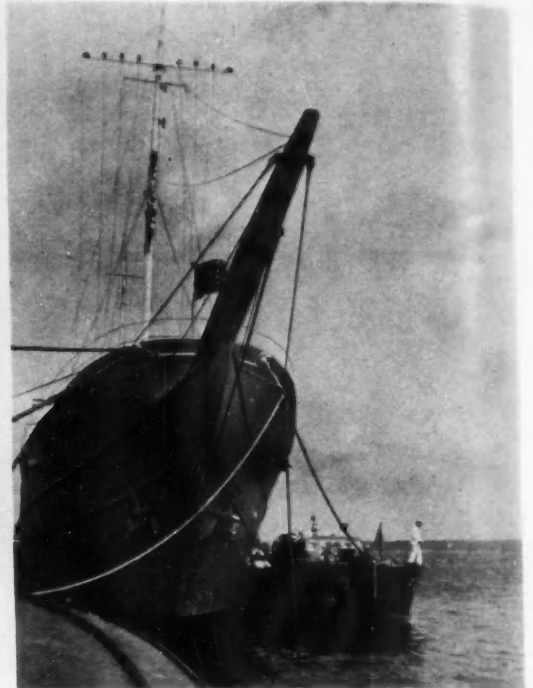
MOBILIZED by Ford Motor Co., machinists were working on 2000-hp P & W aircraft-engine cylinder heads in less than 12 months from the date of ground-breaking for the huge \$27,000,000 engine factory (right). Big Ford defense assignment is producing complete B-24D Consolidated bombers







**TRANSITION** — General Motors engineers studying parts of the Pratt & Whitney aircraft engine before putting it into production. Many thousands of automotive executives, engineers, specialists, supervisors and workers are pitting their training and experience against aggressor nations



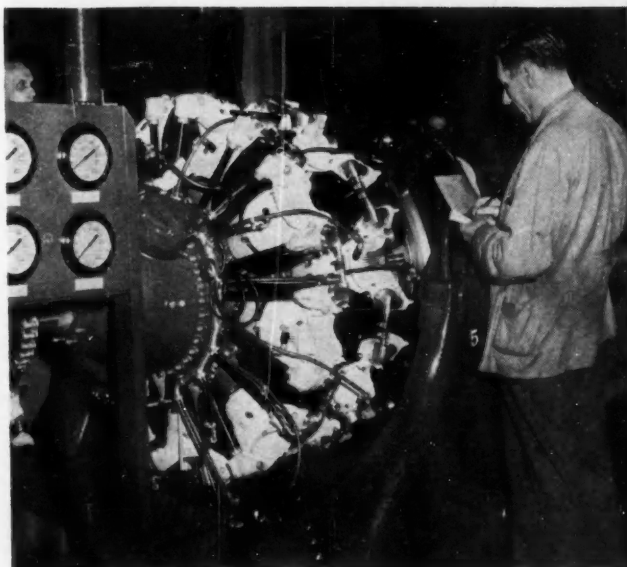
**SEA SCORPION** (upper right), powered with three Packard 1350-hp marine engines, nestles alongside her mother ship, ready to skim the seas in a death-hunt for submarines

**TWO-TON TURRET** being machined in the Chrysler Tank Arsenal. The job called for new plant and tools, but demanded experienced automobile machinists (right center). Chrysler is tooling up also to build 110-hp gasoline engines to power new Sea Otters (cargo ships)



**SHIFTED** from engineering and production of civilian cars and trucks to building Wright aircraft engines, Studebaker engineers are studying ignition harness—one of hundreds of components the company will build for these powerful engines (lower right). Studebaker also has a heavy U. S. Army truck schedule on the books

**CHECKING** oil pressure in a Ford-built Pratt & Whitney 2000-hp aircraft engine, prior to test run (below)



# Defense Front Widens, Its Impact Deepens

SINCE the last issue of the SAE<sup>2</sup> Journal, national defense has assumed hugely greater significance than heretofore, has become in fact the Number One engineering, production, and business factor of the nation.

## Statistically:

- From 70 to 85% of the nation's productive capacity will be devoted to munitions and implements of war within two years if SPAB officials can perform the miracle of putting the proposed \$100 billion program into gear;

- Scores of entire peacetime industries will be manufacturing *nothing* but armaments;

- Two 10-hour shifts a day in factories—many running seven days a week—will be common;

- Scores of new weapons will have been announced as being in production, some making the fabulous imaginings of Jules Verne appear commonplace;

- The government will become the largest owner of manufacturing plants in the country;

- The government will be purchasing most of the nation's raw materials and most of the nation's manufactured products.

## Progress report:

- \$3 billion of the needed armament expansion program projected as far back as 18 months ago has been built, much of it equipped with manufacturing machinery, some of it actually in production months ahead of schedule. The government's plant and equipment account is over \$10 billion.

- Many of the defense problems have

(Continued on page 26)

## "Bright Work" Order Is Issued by OPM

"Bright work" goes off passenger cars on Dec. 15—after which date no producer shall use any metal finish or body trim "containing copper, nickel, chrome or aluminum." This is the main provision of the long-awaited "bright work" order finally issued by the OPM Automotive, Transportation, and Farm Equipment Branch a few days ago. **BUT BUMPER PLATING IS PERMITTED**—under certain definite limitations.

The order says that "permission to use the materials (nickel, chrome, copper, and aluminum) in the plating of bumpers and bumper-guard assemblies may be given upon a showing that such use will utilize all possible conservation measures and will be restricted to minimum practicable quantities. Application for such permission shall be made by a letter addressed to the Chief of the Automotive, T & F E Branch."

It is probable that detailed determination of what constitutes "utilization of all possible conservation measures" will be made following consultation with an OPM Technical Subcommittee of the Automotive Defense Industry Advisory Committee.



## COPPER ORDER Interpreted From Automotive Viewpoint

### What the Order Says

**R**ESTRICTIONS imposed on civilian use of copper in the OPM order (M-9-c) issued Oct. 21 have an immediate impact on every branch of the automobile and parts industry.

The order provides specific restrictions on copper use for manufacture of:

- Garage and automotive repair equipment
- Headlamp and headlamp parts
- Heaters
- Horns
- Hub and gas tank caps
- Miscellaneous fittings and trim
- Moldings
- Rear view mirrors and hardware

Also for:

- All plating primarily for decorative purposes
- Keys and locks
- Name, identification and medal plates
- Non-operating or decorative uses or parts of installations and mechanical equipment, including frames, bases, standards and supports
- Paint (except for ship bottoms)
- Reflectors

For the Oct. 15 to Dec. 31 period, use of copper for these purposes is restricted to one-half the amount used by the individual manufacturer during the last three months of 1940 . . . or one-eighth the total during the calendar year 1940.

After Jan. 1, *no copper may be used* for the manufacture of any of these articles for civilian use *except*:

1. For plating such articles, provided (a) the plating is not primarily for decorative purposes; and (b) the use or normal wear on such an item would make impractical any other form of coating; and (c) that such an item was formerly plated with copper or copper-base alloy, or if such an item was not formerly so plated, then provided that the total amount of copper or copper alloy to be used in the plating of each item

is less than 5% of the amount previously used in the manufacture of the item itself;

2. To comply with Underwriters or safety regulations issued under government authority; (which probably can be interpreted to mean Federal, State or Municipal—although not so stated specifically).

3. When used primarily as a conductor of electricity;

4. For use in research laboratories to the extent that physical and chemical properties make other material impractical;

5. And for several other specific uses not pertinent to the automotive industry.

Restrictions on use of copper in ALL OTHER ARTICLES is also made immediately effective as follows:

During the period between Oct. 15 and Dec. 31 and during each three-month period thereafter until further notice, no manufacturer may use more copper than the greater of the following two limits:

1. 70% of the total amount of copper or copper base alloy, respectively, used by him in the manufacture of such article during the last three months of 1940, or

2. 17½% of the total amount of copper or copper base alloy, respectively, used by him in the manufacture of such an article during the year 1940.

### What the Order Means

If carried out to the letter, this sweeping order will partially nullify the favorable differential in output restriction which existing OPM production allotment orders have given to the smaller passenger car companies as compared to the Big Three.

The output restrictions imposed on General Motors, Chrysler and Ford already are greater than would result from the reduction in vital copper supply of 30% from the last three months of 1940.

If the independent companies, however, are restricted in copper use to 70% of the last three months of 1940, they will not be

(Continued on page 29)

# Subcontracting Due to Expand

**S**UBCONTRACTING America's huge defense effort is not yet so much a fact as an admittedly good idea to:

- Spread the work to keep thousands of erstwhile peace-time factories at work, and
- Thus carry a part of the load of the defense effort.

Floyd B. Odlum, new head of this effort which for nearly a year had been marking up interesting achievements in getting work spread, plans to expand the program along these lines:

- Encourage present large government contractors to set up within their own companies subcontracting staffs to take work out to potential subcontractors, "sell" them on the idea of accepting bits and pieces of the prime contract, teach them how to make the parts, advance them money when needed, loan them engineers and production experts.
- Expand the field organization from the original 30-odd offices in Federal Reserve Branch Banks to from 200 to 250 local offices in industrial centers. There are about 60 now. Each industrial state will have a state headquarters.
- Expand the personnel, particularly with first class production executives, borrowed from industry, augmented with production engineers on the government payroll.
- Extend the Subcontracting Clinic program, equipping them with exhibits of bits and pieces. (See "Engineering" Toledo For Defense, page 33.)

"I would like to have a formula which would keep the small manufacturer in business," Mr. Odlum told a meeting of the National Conference of Business Paper Editors, and said that the press could serve a most important function by calling attention to specific cases of contract spreading.

He expects the automotive parts industry to become subcontractors largely for tank parts, toy manufacturers for light ammunition parts and shells. He even suggests that garages and repair shops might fit into the picture without impairing their present function of maintaining needed vehicles for defense transportation of workers and materials and finished products.

He fears that many of the 184,000 factories in the country cannot be fitted into the subcontracting-for-defense program, hesitates to contemplate their fate as the critical materials picture becomes darker with each successive upping of the defense program, shuddered at the impact of the fateful copper order—being written and rumored during the interview. (See "COPPER ORDER Interpreted from Automotive Viewpoint," page 25.)

## Auto Executives Join OPM Reemployment Job

More than a score of leading automobile and parts manufacturing executives met Oct. 20 to 22, to work out a plan for reemployment and retraining of some 10,000



men laid off in the St. Louis and Kansas City areas caused by auto curtailment.

It is estimated that this number will rise to more than 20,000 within a month or two, when the General Motors plants in these two cities shut down. A recent G. M. agreement provides that its employees, laid off because of material shortages, will be reemployed after employment in other plants without a loss in seniority.

The two-fold problem will be attacked from practical experience gained in smaller situations by the OPM Labor Division, Eli L. Oliver, associate chief, Labor Supply.

However, the problems presented and methods of solving them presented by any one community cannot be applied without modification to other areas, labor experts loaned to OPM by industry, have agreed.

## Defense Front Widens

(Continued from page 25)

jelled sufficiently to pave the way for solution of many baffling problems.

- Allocations are already becoming the determining factor, superseding priorities as an instrument of obtaining needed materials for defense.

- The Army and Navy have retreated from historic positions in respect to details of procurement, and military men are considering wholesale cutting of red tape upon advice of industrialists;

- Astounding achievements have been made in civilian redesign of products to fit them into mass production lines (these are military secrets, will not be disclosed by the SAE Journal).

Perhaps the most significant change observed by the SAE Journal in recent Washington contacts is the belligerent attitude of "offense" on the part of Army, Navy, SPAB, and other government officials who have been talking "defense" heretofore.

Several officials are admitting that they know there may be no legal safety in what they have been doing, but stoutly say they would rather go to jail for sins of commission than to wait for Congress to "catch up" with procedural legislation.

While taxi-cab drivers and secretaries were talking about the U. S. S. Kearny torpedoing, industrialists who are working longer hours than most of them have done for a decade or two were thinking of reverses in Russia, AF of L vs. CIO, and a widespread reluctance of fellow-industrialists to realize with them that we are now at war.

# Birth of A Tank

**P**RODUCTION of tanks is rapidly becoming a major automotive effort in the national defense program.

Chrysler, American Car & Foundry (a big peace-time producer of buses) and hundreds of parts suppliers already have tank contracts and sub-

contracts. General Motors and Ford are negotiating with the Army for heavy production schedules of tanks.

If anyone not involved thinks that pre-production is not a complex travail, read on:

1. An army design of the proposed vehicle is drawn up, based upon Army tank experience, reports from U. S. military attaches abroad, and recommendations of the Ordnance Department. This "step" alone consists of 17 steps, originating in the using arm which denotes the military characteristics, passing to the Office of the Chief of Ordnance, thence to the Ordnance and Tank Corps' joint technical committee, clearing through the office of the Under Secretary of War for approval of the military characteristics of the design, and over to the Industrial Service for detailed design, drawings, specifications, procurement of a pilot model and testing under simulated combat conditions. Reports of detailed progress are cleared through the General Staff, the equipment and the quantities are approved by the Under Secretary, detailed refinements are added, a maintenance and parts program is approved. Then 8 more steps are taken to let the contract, and to provide for further tests, and delivery to the using arm.

2. In the meantime, the Army, through its legislative contact, submits to Congress a request for an appropriation. Sometimes appropriations have been cleared through the Director of the Budget, thus bypassing a series of debates and joint Senate-House committee conferences.

3. While the above is going on, a lot of related work is going forward:

- a. The Tank and Combat Vehicle Division of the Army Ordnance Department is working on detailed drawings, often with the assistance, advice and further design engineering of prospective manufacturers, and

- b. Ordnance Tank Unit is checking with:
  - OPM's Director-General William S. Knudsen to locate adequate manufacturing facilities, either by expanding output of present tank makers, or finding new ones, or both. This involves checking with:

- W. H. Harrison, OPM's Production Division Director, on questions of new plant and equipment that will be required; and
- OPM's Associate Director General Sidney Hillman about locating workers, and training new workers; and

- Charles F. Palmer, OPM's Defense Housing Coordinator to see that there will be houses for "imported" workers and their families; and

- Donald M. Nelson, OPM's Director of (Continued on Page 33)





C. L. McCUEN, vice president of General Motors Corp., SAE member on the Board's Executive Committee

## SAE Members on Board Set Up To Advise on Material Conservation

**C**OOOPERATING with five other major engineering societies, the SAE is a member of the Engineers' Defense Board organized to study conservation and substitution problems; to report to the Government; to disseminate information.

ROBERT E. MCCONNELL,  
OPM Consultant, Chairman  
of the Engineers' Defense Board



Harris & Ewing

**C.** L. McCUEN, General Motors vice-president in charge of engineering, heads the group of six SAE representatives on the newly-organized Engineers' Defense Board. This Board is comprised of about 30 representatives of the six major engineering societies, and is headed by Robert E. McConnell, prominent mining engineer.

The Engineers' Defense Board will:

- Develop technical information to assist OPM and other government agencies in further conserving and substituting critical materials in both defense and civilian products, and

- Disseminate to the engineers of the country through the technical, business and daily press up-to-date information concerning the ever-changing critical materials situations.

Mr. McConnell, until recently chief of

the Conservation and Substitution Section, OPM, undertook the leadership of this important venture with the full approval of OPM's Director-General William S. Knudsen. The Board consists of representatives officially appointed by the:

- Society of Automotive Engineers,
- American Institute of Mining and Metallurgical Engineers,
- American Society of Mechanical Engineers,
- American Institute of Electrical Engineers,
- American Institute of Chemical Engineers, and
- American Society of Civil Engineers.

One member each of the above societies has been designated as a member of the Board's executive committee. Mr. McCuen is the SAE representative of this top group. Other Board representatives of the Society are Arthur Nutt, past president; James C. Zeder, Frank W. Caldwell, C. E. Frudden, and Norman G. Shidle (shown below). Mr. Shidle is

(Continued on page 33)



JAMES C. ZEDER  
Chief Engineer,  
Chrysler Corp.

C. E. FRUDDEN  
Executive Engineer,  
Allis-Chalmers Tractor  
Division



F. W. CALDWELL  
Director of Research,  
United Aircraft Corp.



ARTHUR NUTT  
Vice President  
Wright Aeronautical Corp.



NORMAN G. SHIDLE  
Editor, SAE Journal;  
Chairman, EDB Information  
Committee



## Automotive Branch Head



OEM Defense photo

Andrew Stevenson, Acting Chief, Automotive, Transportation and Farm Equipment Branch, Office of Production Management, is a transportation expert, and was formerly an analyst for the Securities and Exchange Commission, as announced in the SAE Journal, October issue.

## Defense-O-Grams

GADGETS AND CHEMICALS, CLAIMED TO REDUCE GASOLINE CONSUMPTION, BEING REFERRED TO OFFICE OF PETROLEUM COORDINATOR. "BEST" IDEAS BEING SUBMITTED TO NATIONAL BUREAU OF STANDARDS FOR CHECK-UP AND TEST.

★

TRUCK AND BUS INVENTORY UNDER FEDERAL WORKS AGENCY BEGUN IN ALL STATES EXCEPT FOUR WHERE MAILING LIST PROBLEM WAS HUGE, HENCE DELAY. REPORTS FROM MOST OF COUNTRY SHOW JOB IS WELL UNDERWAY WITH PART OF REPORTS COMPLETED.

★

SIMPLIFICATION AND STANDARDS PROGRAM OF OPA CONSUMER DIVISION APPROVED BY ATTORNEY GENERAL BIDDLE—AT LEAST DURING THE EMERGENCY.

★

CYRUS McCORMICK, OPA PRICE CHIEF, AGAIN URGED AUTO DEALERS NOT TO PAD PRICES. THIS, HE SAID, WOULD BE INFLATIONARY AND WARNED THAT OPA WOULD THEN "GET INTO ACTION."

★

WHILE NATION WAS ON DRIVE TO COLLECT ALUMINUM FOR DEFENSE, ARMY WAS BUYING ALUMINUM FURNITURE FOR WASHINGTON HEADQUARTERS.

"AUTOMOTIVE ENGINEERS ARE DOING A MAGNIFICENT JOB FOR DEFENSE," A. D. WHITESIDE, VETERAN OPM OFFICIAL, TOLD THE SAE JOURNAL.

★

SPAB OKAYED 10 MILLION-TON STEEL EXPANSION PROGRAM.

★

## SAE Critical Materials Board Now in Action

A newly-formed SAE Automotive Technical Advisory Board on Critical Materials held its first meeting in Detroit on Oct. 24—just as the OPM "bright work" order (see p. 25) was in final stages of formalization. Aimed at achieving maximum conservation of strategic materials and the best possible utilization of available materials, the Group held its second meeting in Detroit, Oct. 30.

At the first meeting sub-committees were named to assemble quickly factual technical data on (a) bright metal trim, (b) conservation of copper, (c) most effective use of allowable quantities of aluminum, (d) anti-freezes, (e) plastics, and (f) rubber. Reports from each of these sub-groups were heard at the Oct. 30 meeting.

The Group is headed by James C. Zeder, chief engineer, Chrysler Corp., and has as members R. E. Cole, vice president, engineering, Studebaker Corp.; J. M. Crawford, chief engineer, Chevrolet Division, General Motors Corp.; F. F. Kishline, chief engineer, Nash-Kelvinator Corp.; H. M. Northrup, chief engineer, Hudson Motor Car Co.; R. H. McCarroll, chief metallurgist, Ford Motor Co.; C. R. Paton, chief engineer, Packard Motor Car Co.; D. G. Roos, vice-president and chief engineer, Willys-Overland Motors, Inc.

## Trucks and Parts On Ration Basis

ANALYSIS of a number of OPM priority orders issued on trucks and maintenance parts, and interviews with government officials who have been studying allocation policies, permit the SAE Journal to present this up-to-date explanation:

1. Increased defense demands have made many priorities meaningless. Many non-defense manufacturers have found that materials have been impossible to get even with the highest non-defense priority.

2. This means that materials will have to be allocated, but non-defense allocation is still in the stage of theories and far from policy.

With some form of undefined rationing in mind, this is how the truck picture stands:

Extension of the A-3 rating for heavy and medium truck program for 30 days to December 31 was granted manufacturers by Donald M. Nelson, OPM director of priorities, through an order issued by Andrew Stevenson, acting chief, Automotive Branch, Division of Civilian Supply.

• The A-3 priority for new vehicles is applicable to manufacturers only to secure component parts and materials, it was emphasized. Reports that truck users have been ordering complete vehicles on high ratings are being investigated. Official attitude is that the mistakes were probably natural enough, in view of so many new rules and orders having been issued.

• Gross vehicle weight is taking the place of heavy, medium, and light truck categories in OPM's thinking, and may soon begin to appear in orders.

• OPM is planning an inventory study of materials on hand in truck manufacturing plants.

• Suggestions that the restriction on the manufacture of medium trucks should be lifted appear to be a lost hope in view of the upping of defense estimates and the resulting reduction of stocks of materials in hand. An Army spokesman, on the other hand, said he had urged lifting the production ceiling on all trucks of 1 1/2 tons and larger.

• Bus makers report that restrictions imposed on production are causing hardships for workers in many localities, that deliveries will be slower and slower while orders are mounting. They have doughty support in Ralph Budd, OEM transportation commissioner.

• Government spokesmen report that many truck users are using the Preference Rating Order P-22 for securing parts without first having exhausted supplies in wholesalers' hands. Again, this is considered an "excusable error," due to the considerable confusion arising from numerous orders. A recent nation-wide survey indicated no imminent shortage, but private reports show that the situation is none too good.

• Commissioner John L. Rogers, chairman, Central Motor Transportation Committee, is urging all users to increase the efficiency of their operations, to adopt preventive maintenance, to increase the size of each load. This educational program is most difficult with individual owners and with owners of a few trucks each. However, most of the trucks registered in the U. S. are thus owned.

# Trend of Thinking

OFFICIAL Washington agrees that things in this country will become far worse before they get better. Here are some recent observations from the men in charge of defense, gleaned by the SAE Journal:

"Too many have hoped against hope that the Lord would take Hitler by the neck and throw him out. American business is now seeing clearly, I think, that we've a tough job to do. I am in favor of doing it in one and a half years or two, instead of going through this agony for ten years." William S. Knudsen, OPM Director-General, SPAB member.

"Our whole defense program is too small, yet the average business man does not seem to have any idea of its magnitude. Everything non-defense must be shrunken, and in the shrinking process I'll become one of the most hated men in Washington. But I want to get this job done as quickly as possible and get home to my family and private business again." Donald M. Nelson, Executive Director, SPAB.

"We are reluctant to 'crack down,' because perhaps some of us have failed to propagandize the urgency of defense. The situation is desperate, and it's getting worse all the time. We simply can't live the way we've been living and lick Hitler." Leon Henderson, Price Administrator, SPAB member, OPM Civilian Supply Director.

"A bright spot is that more of my business friends are at last beginning to see the seriousness of our situation. Some are realizing what warfare means today." Gen. Benedict Crowell, Assistant Secretary of War, World War I.

# Materials Hoarding

EXCESSIVE inventories of raw materials in hands of non-defense manufacturers are bringing many OPM experts near to apoplexy, and a bill permitting the government to take over excessive stocks of materials is in the throes of legislation.

However, Deputy Director Philip D. Reed of the OPM Materials Division, told the SAE Journal that he has rarely seen a case of willful violation of the several OPM attempts to control this situation, and said that such forward buying was considered good business practice in peacetime. He felt that executives who had done so during the emergency probably didn't believe that the shortages were as critical as OPM had been saying.

Replies to a questionnaire sent out to 87,000 firms on August 31 are coming in and are being tabulated, he said. Manufacturers are ordered by OPM not to lead up beyond a minimum practical inventory.

"But the whole picture is black, and is getting blacker. The simple fact is that there is only a given amount of materials in this country, and the size of the defense program is going up all the time.

"Slight increases of available materials for 1942 are in sight, but these have been accounted for in our statements from time to time on the materials situation. Some sub-marginal ores will be taken up, but there is a limit to stretching the supply to any important percentage in that field," Mr. Reed, chairman, General Electric Co., said.

"Conservation of what we have is the most prolific source of stretching out the available metals and other materials. By conservation I mean redesign of products to use less material, organized programs in plants to reduce scrap, and using any possible substitution of materials."

With the constant rise of the estimated needs of materials as the defense program mounts by leaps and bounds, other material experts in Mr. Reed's and other departments are loath to make estimates.

Lessing J. Rosenwald, OPM's new chief of the Conservation & Substitution Branch, referred to the Engineers' Defense Committee, headed by Robert E. McConnell (see page 27) as an important step, as did William S. Knudsen, in an informal talk before business paper editors.

# Copper Order Interpreted

(Continued from page 25)

able to produce the maximum quota of cars permitted them by existing OPM allotments.

Another nullification of the intent of previous OPM orders (although falling equally on all the companies of the industry) will come about in the production of medium and heavy-duty trucks for which an A-3 priority rating has been provided and for which production ceilings already have been set higher than those of the last three months of 1940. Reduction of 30% in copper use for these trucks would reduce the output proportionately.

Detailed interpretations of the order had not been made by OPM officials as this article went to press. How the relationships between the apparently conflicting rulings would be resolved was not yet clear, but careful reading of "Miscellaneous Provision (3)" of the order indicates strongly that the intent is to have this order supersede the allotments where the allotments could call for more copper than the order permits. Nevertheless, there are other indications that individual representations by individual companies may be used as the basis for modification of the copper order where, in OPM opinion, such modification seems justified.

Technical and commercial readjustments of importance will be brought about in a variety of ways as the full impact of the order hits. Here are a few of the more important:

**Radiators:** Copper will be permitted for radiators (and bearings and bushings and other clearly functional parts) up to the specified "70%" limit. . . . There is no assurance, however, that later copper shortages will not result in further orders, striking even at this vital vehicle part. . . . When, as, and if such orders come, there are prominent signs that any consideration given to automotive pleas for relief may be in direct ratio to the energy and success with which manufacturers voluntarily have sought and found some way to get some copper out of radiators in the meantime.

**Wiring:** Electrical conductors are permitted.

# OPM Studies Methods For Getting More Tools

Further basic studies in achieving larger machine-tool production, using the experience gleaned to date by OPM tool experts, are under way in view of the recent huge increases in armament production estimates.

## Background:

Normal production of new machine tools in the U. S. has been running about 25,000 per year.

1940 production, about 100,000 units.

1941 production, about 200,000 units.

Current designs, on the average, are tools with about three times as much productive capacity per unit as prior to the war defense effort.

Hence, the 24-month period of 1940-41 showed a machine-tool manufacturing capacity equal to the total of the 930,000 machine tools (*American Machinist* estimate) in existence in the U. S. in 1940.

**Headlamps:** The composite type of headlamp, using a copper reflector, is definitely eliminated by this order. Some manufacturers of this type of equipment will probably go to a steel-backed, plated reflector. The amount of copper used for plating this steel-type reflector will be well under the "5% of former total" requirement of the order.

**Heaters:** Heaters which circulate cooling water through brass heater cores are eliminated by this order. Exhaust or gasoline-burning type heaters, now in minority use, may be continued with design changes to eliminate copper details.

**Bumpers—and other "twilight-zone" parts:** The copper order uses the term "plating for decorative parts" without incorporating an exact definition. Consequently specific interpretations can be expected upon request to OPM. It is reasonable to believe that such parts are permitted to be plated under the "bright work" order (just issued under OPM Automotive Branch auspices) will be considered to be non-decorative or functional in interpretation of the copper order. Bumper plating under certain restrictions is permitted by the "bright work" order; it seems likely, therefore, that bumpers will not be interpreted as being in the category of "decorative parts" for which no copper may be used after Jan. 1.

Specific rulings will have to be obtained from OPM, however, (probably from the Automotive Branch) before such assumptions can be considered certainties.

So far as the details of the copper order are concerned, the Director of Priorities may make minor modifications to meet unusual situations—but such modifications seem likely to be made only when clear proof appears—not only of vital need for relief—but also of action on the part of the manufacturer which will render the need for such relief very temporary. Applications for special consideration should go directly to the Director of Priorities, who will refer to the Automotive Branch for advice. The provisions of the order *must be followed*, however, unless specific exceptions are permitted by the Director of Priorities.



1942 Models



*Buick*



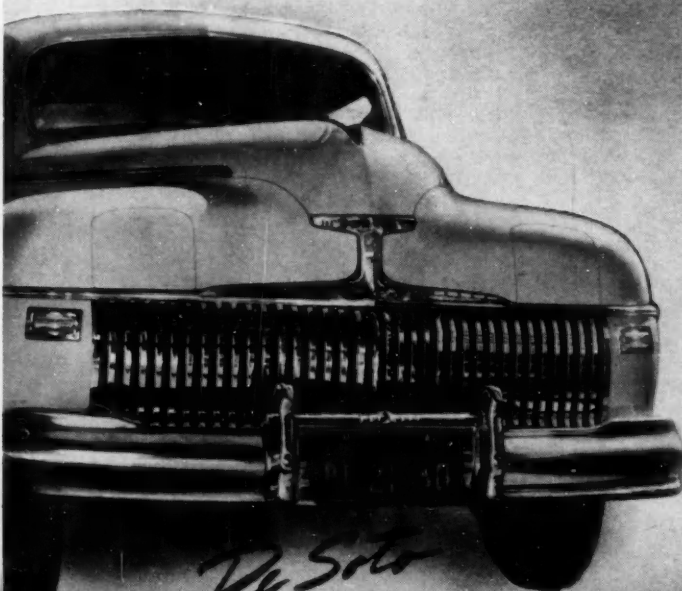
*Cadillac*



*Chevrolet*



*Chrysler*



*De Soto*



*Dodge*

1942 Models



*Ford*



*Hudson*



*Mercury*



*Oldsmobile*



*Nash*



*Lincoln*



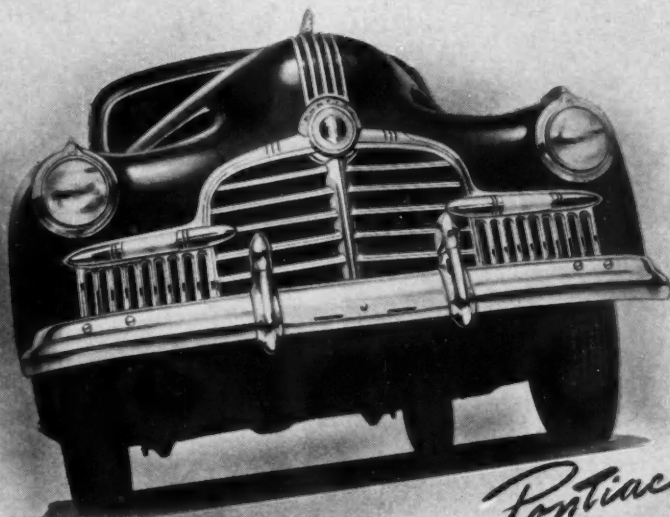
# 1942 Models



*Packard*



*Plymouth*



*Pontiac*



*Willys American*



*Studebaker*



## Engineers' Defense Board

(Continued from page 27)

chairman of the Committee on Information, through which the reports of technical studies will be disseminated.

### Shell Casing Study Typical

Typical of the Board's functioning in developing practical data to submit to OPM, was the early appointment of Mr. McCuen as Chairman of a Committee on Steel Alloy for Cartridge Shells. A report signed by Zay Jeffries, Advisory Committee on Metals and Materials, National Academy of Sciences, suggested substitution of some other material for red and yellow brass shells. It was estimated that hundreds of thousands of tons of copper might be saved annually if such a substitution could be made. (These savings might well represent many times the amount used by the automotive industry each year.) Such a substitution, if possible, could end the current copper shortage problem.

The report of Mr. McCuen's committee will be submitted to the Executive Committee, which will in turn report the conclusions and recommendations to OPM and other government agencies interested in this problem. Details of studies such as this often will be publicized to the 80,000-odd engineers represented by the Board through the six society journals, and through the technical, business, and daily press.

Other projects already getting attention by the Board are:

- Steel Conservation and Reclamation,
- Waste Materials,
- Nickel and Nickel-steel Alloys,
- Substitutes for Copper,
- Aluminum.

OPM officials have approved a plan to meet soon with the Board in Washington, to give its whole membership of more than 30 representatives first-hand information about material shortages.

The Engineers' Defense Board will also serve as a clearing house to secure competent speakers at technical meetings to report on studies being made and completed.

Dr. Harry S. Rogers, president, Brooklyn Polytechnic Institute, is vice chairman of the Board, and A. B. Parsons, secretary, American Institute of Mining & Metallurgical Engineers, is secretary.

Two representatives of other engineering societies on the Board are also SAE members: Dr. Zay Jeffries, American Institute of Mining & Metallurgical Engineers, and Dr. Robert E. Wilson, American Institute of Chemical Engineers.

The personnel of the Executive Committee of the Engineers' Defense Board under Mr. McConnell is: Dr. Rogers, vice-chairman; Mr. McCuen, SAE; Carlton S. Proctor, consulting engineer and president, American Society of Civil Engineers; John F. Thompson, executive vice-president, International Nickel Co., American Institute of Mining and Metallurgical Engineers; R. M. Gates, president, Air Preheater Co., American Society of Mechanical Engineers; H. H. Barnes, Jr., vice-president, General Electric Co., American Institute of Electrical Engineers; F. W. Willard, president, Nassau Refining Co., American Institute of Chemical Engineers; and Mr. Parsons.

The functions of the Board include:

- To inform engineers about materials shortages,
- To publicize and make applicable reports and recommendations of the various advisory committees of the National Academy of Sciences,

- To urge engineers to:

Adopt recommended procedures calculated to accomplish the objectives of national defense agencies, Promote increased production of scarce raw materials,

Conserve the supply of industrial materials, and

Simplify design and production.

- Act as a clearing house between engineers or engineering groups of information on substitution, waste prevention, and conservation,

• Name special committees for specific studies at the request of the Army, Navy, or other government agencies to deal with engineering problems related to defense, and

- Select projects dealing with defense and report upon them, with due regard to work of existing agencies.

Members of the Committee on Information serving with Mr. Shidle are John H. Van Deventer, editor, *Iron Age*; Sidney D. Kirkpatrick, editor, *Chemical & Metallurgical Engineering*; Burnham Finney, editor, *American Machinist*; Harwood Merrill, managing editor, *Modern Industry*; H. Judd Payne, vice president, F. W. Dodge Corp.; Paul Wooton, president, National Conference of Business Paper Editors; and Leslie Peat, SAE Journal.

Editors of society journals represented on the Board will be ex-officio members of the committee, and other editors will be added representing various industry publications from time to time as the need arises.

## "Engineering" Toledo For Defense

TOLEDO manufacturers, faced with the problem of getting defense work into their plants, have decided to "production engineer" the city as a unit, and break up contracts distributing parts to individual companies which can make them.

The policy committee, consisting of Charles Swartzbaugh, president, Swartzbaugh Mfg. Co.; Frank Draper, Acklin Stamping Co.; O. E. M. Keller, Kasco Mills, Inc., and president, Toledo Small Business Men's Association; Frank H. Adams; Earle S. Smith, Toledo Porcelain Enamel Co.; A. W. McKinney, National Supply Co.; and representatives of the CIO, AF of L, and the Mechanics Educational Society, was approved on October 3, by 78 executives of 51 Toledo companies, labor organizations, and the Toledo Chamber of Commerce.

They met with more than a score of OPM officials and Army and Navy officers. U. S. Representative John F. Hunter served as chairman of the meeting, and Alex Taub, assistant to Sidney Hillman, OPM, as well as Army officers explained the government procurement policies.

### Urges Business Approach

Joseph E. Padgett, vice president of Spicer Mfg. Corp., urged considering the committee as a board of directors who should be charged with the task of selecting a full-time general manager for getting defense business into Toledo, that this general manager hire the necessary production engineers and other assistants to see that the program is launched and to assure that the products manufactured by the several plants be up to government specifications.

"Let us think in terms of a single factory, with a hundred or more departments—these being individual factories. It will

## Birth of A Tank

(Continued from page 26)

Priorities, who would give the manufacturer a project rating to assure materials, machinery, and parts; and

• Floyd B. Odum, OPM's Director of Contract Distribution Division who would inquire if the proposed manufacturer would subcontract a sufficient amount of the work to spread the defense effort and proceed to aid in securing such subcontractors; and

• Douglas C. MacKeachie, OPM's Director of Purchases, to secure additional plant sites and land for workers' homes, if necessary.

In the meantime, an important tank program would be studied by the Supply Priorities and Allocations Board (SPAB) headed by Vice President Wallace to determine the relative importance of the undertaking in view of the over-all U. S. military, Lend-Lease, Defense-Aid, and civilian demands mosaic.

4. Either before or after the contract has been actually signed by the manufacturer, the question of government financing is referred to the Defense Plant Corporation, subsidiary of the RFC, headed by Secretary of Commerce Jesse Jones, also Federal Loan Administrator. If the program is to be privately financed, however, it is referred to the National Defense Advisory Commission for a tax amortization certificate.

5. Estimates of production rates are filed with the OPM, and a release is given for a "pilot" tank. When this "pilot" is completed, it is given a thorough testing under simulated combat conditions, results of which may call for either

- Partial redesigning, or
- Immediate "go-ahead" order for the whole program.

The 1942 appropriation for tanks is expected by OPM officials to reach \$1 billion, and the OPM Tank Section, headed by W. W. Knight, Jr., has been loaned to the Ordnance Department. It is now a part of the Department's Tank and Combat Vehicle Division, headed by Lt.-Col. John K. Christmas. This merger was calculated to save time, and is accounted for in (3), above.

Medium tanks (30-ton) are now in production at the Chrysler Tank Arsenal, Detroit; American Locomotive Co., Schenectady; Baldwin Locomotive Works, Chester, Pa.; Pullman Standard Corp., Hammond, Ind., and Pressed Steel Car Co., Chicago, Ill. The Lima Locomotive Works, Lima, Ohio, has a contract, is expected to be in production this fall.

Light tanks (13½-ton) are in production by American Car & Foundry Co., at Berwick, Pa., and St. Charles, Mo. The 1500th tank recently was run off the production lines of that company.

Armored vehicles are being built by White Motor Co., Diamond T Motor Co., and Autocar Co.

take a lot of careful planning and a lot of good engineering, but it can be done," Mr. Padgett, a past vice president of the SAE, said.

"If we get away from talking about getting more business in Toledo and begin to bid on specific contracts, through this committee, we will be getting some place," Mr. Adams told the meeting.

Mr. Taub pointed out that such a committee could, through its combined efforts, undertake to make almost anything required by the government in Toledo.



**Thomas J. Little, Jr.**

(1875-1941)

**T**HOMAS J. LITTLE, Jr., president of the Society of Automotive Engineers in 1926, died of a heart attack on Oct. 6 at his home in South Bend. He was 66 years old.

Mr. Little was director of engineering, Bendix Home Appliances, Inc., at the time of his death, having spent the later years of his life in the electric refrigerator and washing machine fields following a long career of significant achievement in passenger-car engineering and gas-lighting developments.

Imaginative, forthright and forward-looking, Mr. Little held basic design patents on some 360 inventions in general use in the automotive and electrical refrigeration and gas lighting industries. His connection with the automotive industry began in 1917 when he went to the Cadillac engineering department, where, shortly, he became research and experimental engineer. In 1918, he joined Lincoln in the same capacity. Later he became chief engineer of Lincoln and held that position at the time he served as SAE President. During the period of World War I, he collaborated with Packard, Ford, and Cadillac in the development of the Liberty Engine under Government direction.

Mr. Little became chief engineer of Marmon Motor Car Co. in 1927, later leaving the automobile industry to become chief engineer of Copeland Refrigeration Co. Following several years practice as engineering counsel and patent litigation expert, he joined the Easy Washing Machine Co. of Syracuse in 1937 as chief engineer, assuming a similar position at Bendix Home Appliances Inc., in December, 1940.

Both before and after his term as President, Mr. Little was active in SAE affairs. He was chairman of the Detroit Section (1923); of the National Meetings Committee (1924-25); and of the Syracuse Section (1939-40). Serving on numerous technical committees and often representing the Society in engineering liaison with outside technical organizations, he was, for several years, a member of the Contest Board of the American Automobile Association.

Before entering the automotive field, Mr. Little had attained prominence for his technical achievements in gas lighting research and development. His first job, after graduating from the University of Pennsylvania with an M.E. degree, was installing isolated electric lighting and powerplants. Later he formed a company to market a high-powered, self-intensified gas lamp. It contained a supercharger driven by a motor device of a type identical with those later used on internal-combustion engines, the motor receiving its energy from the waste heat of the lamp itself. When this lamp proved to be the most powerful illuminant of that period, Mr. Little's company and his numerous patents were taken over by the Welsbach Light Co. of Gloucester, N. J., and Mr. Little became chief engineer of that company. Mr. Little was one of the founders of the Illuminating Engineering Society, and by 1914, his gas-light researches and developments had won him a gold medal at the Panama-Pacific Exposition of San Francisco.

Mr. Little joined the SAE in 1919.

He leaves a widow, a son, a daughter, and a brother.





**Robert V. Kerley**  
Dayton



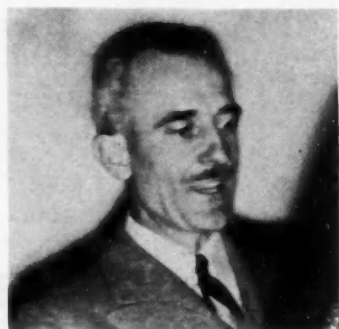
**Arthur Townhill**  
Cleveland



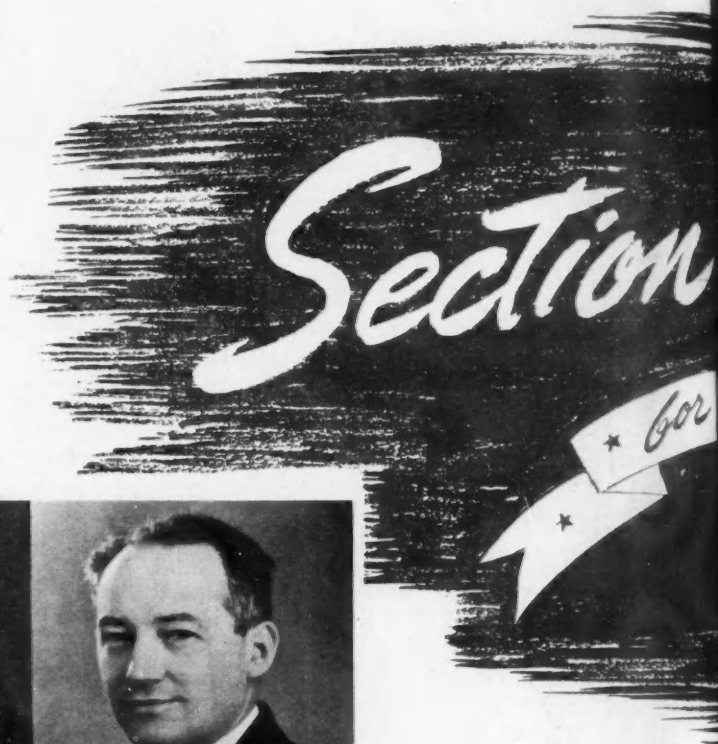
**Harold R. Berg**  
Kansas City



**C. F. B. Roth**  
Syracuse



**Clayton Farris**  
Metropolitan



**George L. Brinkworth**  
Indiana



**Charles E. Hathorn**  
Buffalo



**Earl A. Marks**  
Oregon



**Mac Short**  
Southern California



**H. B. Hawk**  
New England



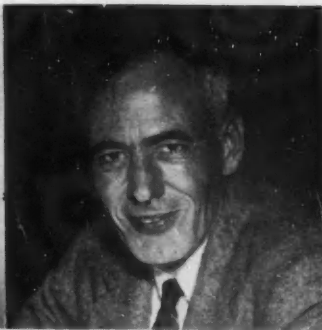
**Robert W. Hogan**  
Baltimore



**Charles F. Becker**  
Northern California



Harry W. Boord  
Pittsburgh



Chester R. Wells  
Southern New England



Grover C. Wilson  
Milwaukee



G. C. Richardson  
Tulsa Group

# Chairmen

1941 - 1942



Tore Franzen  
Detroit



Emil P. Gohn  
Philadelphia



Leonard B. Gilbert  
Chicago



Theodore C. Howe  
Northwest



R. W. Richards  
Canadian



John H. Geisse  
Washington



Adam Ebinger  
St. Louis



## Critical Materials Among Major Topics at SAE Tractor Meeting

Implement-tractor cooperation stressed; rubber tire and track development, earth moving equipment progress are outlined

By Carl F. Meyer

**I**MPORTANT developments in rubber tire and rubber track design and their applications to tractors and industrial equipment; progress made so far, and what can still be accomplished in bringing about even greater cooperation between tractor and farm implement designers and manufacturers to broaden the scope of "interchangeability" of farm tractors and implements; a discussion on methods and costs involved in earth moving; and, finally, a resume of what has already been done, and what the industry may expect in the future relative to finding suitable substitutes for materials of importance in production of agricultural and industrial equipment, highlighted the six papers and discussions at the National Tractor Meeting of the Society of Automotive Engineers, held at Hotel Schroeder, Milwaukee, Wis., Thursday and Friday, Sept. 25-26.

### President Colwell at Banquet

Featuring the annual SAE banquet was the personal appearance of SAE President A. T. Colwell, who presented a highly important, informative and interesting discussion on the "whys" of German successes with their blitzkrieg, and the steps the United States is taking to build armed forces that will be thoroughly capable of successfully resisting such war operations.

This year's two-day meeting again established a new high in attendance, with approximately 450 tractor engineers, allied technicians and guests registering. The banquet attendance of 331 persons also set a new high mark for this annual event.

In charge of arrangements for the tractor meeting was a committee of six headed by A. W. Lavers, assisted by C. G. Krieger, L. S. Pfost, J. S. Erskine, O. E. Eggen, and

T. L. Swansen, Allis-Chalmers, Milwaukee, who handled local arrangements.

Session chairman at the opening meeting Thursday morning, which was devoted to "Rubber Tire and Rubber Track Development for Heavy Duty Industrial Equipment," was L. S. Pfost of Massey-Harris Co. Introducing Secret Service Agent P. J. Gruber who showed a motion picture "Know Your Money" relating to counterfeiting and forging, before adjournment Thursday noon, was SAE Vice President C. W. Smith, agricultural engineer at the University of Nebraska. Mr. Smith also was chairman of the annual banquet that evening.

Due to illness which has forced his stay in a Chicago hospital, John S. Erskine, International Harvester Co., was unable to preside at Friday morning's meeting, and substituting for him was E. C. Brown, Western Austin Co. This session was devoted to "Earth Handling Equipment." The afternoon meeting, treating "Substitution of Materials in the Design of Agricultural and Industrial Machinery," was in charge of Elmer McCormick, John Deere Tractor Co. C. E. Frudden of Allis-Chalmers, Milwaukee, was toastmaster at the banquet Thursday evening.

An innovation at this year's Tractor Meeting was an entertainment staged following

the banquet by a group of sales representatives attending the two-day meeting. Highlighting the entertainment was a floor show, luncheon and refreshments.

### Tires and Tracks

Three papers comprised the "Rubber Tire and Rubber Track" meeting Thursday morning. Walter Lee, Goodyear Tire & Rubber Co., discussed "What the Designer Should Know About Tires for Earth Moving Equipment"; L. W. Fox, Firestone Tire & Rubber Co., took up "What The User Should Know About Tires for Earth Moving Equipment," and R. Mayne and H. W. Delzell of the B. F. Goodrich Co., presented a paper on "The 'Square Wheeled' Tractor Goes to Town."

Mr. Lee, covering the problems of producing a tire suitable for the various types of earth moving equipment, described the three major classes of earth-moving jobs and the tires best suited in each case. For "off-the-road" jobs, where slow-moving tractor-drawn equipment is used for short hauls, he said, it is not necessary to worry about the traction ability of the tire. However, to provide full protection from cuts and bruises, as well as the fullest flotation, an overall design with shallow buttons closely nested is required.

For self-powered scrapers, or tractor-trailer units, used in comparatively long hauls, and at speeds up to 25 mph, the bar-type tire is proving most successful, Mr. Lee continued. This tire incorporates qualities and design that stand up under stresses and strains of driving and breaking, and offer a maximum traction to keep the unit going through deep and slippery mud. These tires usually have one-way tread patterns and must be mounted on driving wheels to rotate in the direction to plow the mud out through open end channels to each side of the track. The disadvantage of the bar type tire is in starting up under full load where there is a tendency to dig in and to bog down in sandy loam if the wheels slip or spin.

This open-type design, he said, is not necessary in designing tires to be adopted to high speed truck or tractor-trailer units used on prepared road surfaces such as in mines and quarries. While flotation is desirable to insure riding quality, resistance to bruises and cuts is essential in the design of such tires, Mr. Lee stressed.

"Naturally, haulage roads are very abrasive. Ordinary tread rubber that would be quite satisfactory on smooth highways would wear down quickly on haulage roads made of iron ore and rock. Also, a good mine tire must have the tread pattern of such a nature that a maximum of rubber bars and a minimum of tread grooves are presented to the ground for road contact. By having the sides of the narrow grooves slanting and well rounded, the carcass is protected against road hazards to the maximum degree and the tread still retains sufficient traction, even though this quality is secondary," Mr. Lee stated.

Mr. Lee also explained the engineering process his company followed in designing a special order tire for use on an underground coal carrier. This equipment carried a load of 6000 lb and required a tire with a maximum outside diameter of 27 in. The tire finally developed was a 14-ply unit, requiring a 75 lb air pressure. The height of the tire was 8 1/2 in. and the sectional diameter 8 1/2 in., with the rim diameter being 10 1/2 in.

Following the tire theme of this session was the paper, "What the User Should



Know About the Selection and Care of Tires for Better Earth Moving Performance and Economy" by L. W. Fox of Firestone, in which Mr. Fox pointed out that the operators of such equipment should make it their business to know many of the facts the tire designer must know in designing the tire.

Mr. Fox named five fundamentals to be decided on by the user in purchasing new equipment: first, tire size; second, tire type; third, rim size; fourth, inflation pressure, and fifth, whether single or duals should be used. He said that tire size depended upon the weight of the equipment, both empty and full; the weight of the material to be hauled; distribution of gross load; speed of the equipment; length of the haul, and, the condition of the haul road.

"With this information before him, the user can then discuss his problem with a competent tire man and arrive at the proper size," he explained.

It was his contention that over-inflation is generally more harmful than under-inflation of tires on industrial equipment. Lower tire pressure, he said, reduces the tendency to rock cutting and the chance of impact or concussion failures.

While both single and dual equipment have their respective advantages and disadvantages, Mr. Fox believes "that in the 'rough and tumble' operations, single tires are decidedly better, and are to be preferred over duals. Single installations have decided advantages in rough ground operations, he claimed. Tires are not subjected to momentary extreme overloading as in the dual assembly when one tire carried the entire load. There is no space to pocket stones. In soft going it is generally recognized that single tires pull easier making it possible to operate in a higher gear and so increase the speed and overall efficiency of the equipment.

"Pneumatic tires provide industrial equipment with a big advantage over steel-equipped earth hauling equipment relative to 'rolling resistance,' Mr. Fox continued. Principal advantages of tires, he said, are: (1) that they accommodate themselves to hard surface irregularities; and (2) they cease to displace soil as soon as the soil is compacted to the point where its supporting strength is slightly above the inflation pressure of the tires. However, he commented, "the pneumatic tire has the disadvantage that energy is lost as a result of flexing."

Also covered in Mr. Fox's paper were reasons for tire failures. Concluding, he pointed out that "tire cost is one of the most important items in the budget. One of the best ways to control it, is to start with the proper type and size, which can only be arrived at after intelligent analysis of all facts pertaining to the operation. Having started with the proper equipment, it is largely a matter of faithfully carrying out a sensible service program, leaving as little as possible to chance."

Completing the session devoted to tires and rubber tracks was the paper "The 'Square Wheel' Tractor Goes to Town," in which R. Mayne and H. W. Delzell, B. F. Goodrich Co., pointed out that "the crawler tractor of today is a far cry from the clanging, lumbering machine from which it sprang only a few decades ago. Through rapid engineering advances, it has become a dependable piece of equipment, neatly proportioned and easily handled."

Three designs, developed from the basic rubber track designed by the Goodrich company, were discussed. Included was the



A. T. Colwell,

with

C. W. Smith,

SAE President, at Tractor Meeting, Talks

SAE Vice President, Tractor Activity

"continuous band track," molded integrally into a single continuous piece, which now is being used on U. S. Army half-track scout cars; the band block track made from a number of separate blocks bolted to the cross members; and the track that has been designed especially for use on a farm or industrial tractor.

"The need for an inexpensive track has  
(Continued on page 45)

## More Flying Fields Needed for Alaskan Defense

■ No. California

Alaska needs a great number of good landing fields for defense purposes, although it will not be necessary to station many planes there since they can be flown from United States bases in eleven hours non-stop, private-plane aviator William V. Hanley, Standard Oil Co. of Calif., told the 138 Northern California Section members and guests at the Sept. 16 dinner meeting, Hotel Leamington, Oakland. Today, he added, airplanes are more numerous than automobiles in many parts of Alaska. Mr. Hanley supplemented, with colored motion pictures, his talk on trips he had made to Mexico City and Alaska by private plane.

Viewing Mexican pyramids 6000 years old and larger than those in Egypt; setting a small plane altitude record over Mexico City; navigation sufficiently accurate to hit the only available spot within a hundred miles level enough for a landing field; and

making a crash landing in heavy underbrush were some of the experiences recounted by the aviator.

Cross-country flying by civilians is bound to increase, Mr. Hanley prophesied, predicting a plane giving 25 mpg. of gasoline and 2000 miles to a quart of oil.

A before-the-meeting visit to the U. S. Navy's Alameda air station — potential home port of all naval planes that fly over the Pacific waters — opened the Northern California fall session. Section members were shown around the repair shops of the two-mile-square base. These shops are equipped to handle major overhaul and repair of all types of naval airplanes and engines.

The SAE was the first group of civilians to visit the station.

## Plastics Evaluated as Substitutes for Metals

■ Philadelphia

Next year we may be looking for substitutes for plastics, but now we are discussing the use of plastics as substitutes for metals which are needed in the defense program. This statement by S. J. Zarger, of the Rohm & Haas Co., and his development of the topic "Plastics in Defense" from the standpoints both of direct military use and of consumer use of plastics to replace metals, followed by the film "The Magic of Plastics" produced by the *Modern Plastics Magazine*, held the interest of nearly 100 members of the Philadelphia Section for their first meeting of the fall.

Mr. Zarger divided the field of plastics

# SAE NATIONAL TRANSPORTATION and MAINTENANCE MEETING HOTEL STATLER • CLEVELAND, OHIO NOV. 13-14

Austin M. Wolf,  
General Chairman

Thursday morning

**NOV. 13**

## NATIONAL DEFENSE DAY

G. D. Gilbert,  
Chairman

Enhancing Intensity Usage of Motor Vehicles  
— *F. K. Glynn, American Telephone & Telegraph Co.*

Thursday afternoon

**NOV. 13**

## TRUCK AND BUS SESSION

H. E. Simi,  
Chairman

State Restrictions on Motor Vehicles and Their Effect on  
Defense Transportation  
— *Louis Morony, Automobile Manufacturers Association*

Thursday evening

**NOV. 13**

## NATIONAL DEFENSE DAY BANQUET

Arthur Townhill,  
General Dinner Chairman

T. L. Preble, Toastmaster

Motor Transportation and National Defense  
— *Major-Gen. Edmund B. Gregory, Quartermaster General, U. S. Army*

Friday morning

**NOV. 14**

## ENGINE MAINTENANCE SESSION

S. B. Shaw,  
Chairman

Engine Deposits—Prevention and Removal  
— *Errol Gay, Ethyl Gasoline Corp.*

Friday afternoon

**NOV. 14**

## PUBLIC UTILITY SESSION

Randolph Whitfield,  
Chairman

Defense Impact on Motor Transportation  
— *John L. Rogers, Commissioner, Interstate Commerce Commission; Chairman, Central Motor Transport Committee*

into three groups: thermosetting, thermoplastic and laminated. The first group, which when once worked cannot be reworked, is familiar to all because most of the well known bakelites belong to this group. However, designers should know that there are many phenol and urea formaldehydes having a variety of physical properties suited to many different applications. One of the most important is that of impact strength. This the speaker showed generally decreases as the tensile strength is increased and also as the water absorption tendency is decreased. Articles of thermosetting plastics can be produced by compression molding and by a new method of casting. Sheet and rod are also available.

Various thermoplastic materials were mentioned, but Mr. Zarger limited his detailed discussion to the acrylics, known to the trade as plexiglas, chrysalite and lucite. These plastics are light, have an impact strength much greater than that of glass, yet less than some bakelites, are completely unaffected by water and have a tensile strength of up to 9000 lb per sq in. However, the tensile strength falls off at elevated temperatures (3000 lb per sq in. at 160 F) which fact must be considered in many applications. In aircraft work the usual temperature range is taken as from -40 to +140 F. The acrylics can be fabricated by compression molding, by injection molding (the heated material is forced into a cooled die as in die casting) and by extrusion. These thermoplastics can be reshaped when heated, as when sheets are given compound curvature for airplane gun turrets, bomber noses, etc., and can also be machined cold like wood. Built-up sections and reinforcements can be fabricated by cementing parts together with a liquid of the same substance as the parts joined, thus producing a perfect joint. The forms used for large parts, such as bomber noses which are 40 in. in diameter, are much cheaper than the dies for compression molding; a simple wood or plaster shape is all that is needed on which to drape the warmed plastic sheets.

Laminated plastics and their uses were discussed. The tensile strength and specific gravity of birch plywood laminated with plastic adhesive were given as 10,000 lb per sq in. and 0.63 respectively; the same specifications for the recently developed compressed plywood of the same materials were given as 25,000 lb per sq in. and 1.4 respectively. Mr. Zarger briefly described the technique by which large parts, such as airplane fuselages, are made of laminated plywood. Only one rigid die is used, the member which squeezes the plywood to the contour of the die is a rubber bag, the die and the bag are enclosed in a case and then the bag is inflated with hot air or steam to cure the plastic adhesive, which is of the thermosetting type.

F. L. Creager, chairman of the meeting, emphasized the fact that plastics are not just substitutes—which by inference are inferior to the original material, but are alternate materials, which when properly applied are often superior to the material formerly used. He brought with him numerous parts in duplicate to show the old die-cast or machined metal object and the new plastic counterpart. In all cases there was a saving in weight and cost and an improvement in the appearance. Mr. Creager also mentioned the use of fiber fillers and creped paper for reinforcement in deep molded objects.

In answer to a question by E. P. Gohn, chairman of the Philadelphia Section, about the cracking of plastics away from the steel frame of steering wheels, Mr. Zarger dis-

caused the coefficient of expansion of plastics and how expansion problems are met in the design of large plastic objects. C. M. Billings asked about the production of airplane propellers having physical properties which vary from hub to blade tip. It was explained that by building up the laminations with stronger woods near the hub and lighter woods near the tip and by using varying pressure along the length of the blade during the curing process, it is possible to have light weight combined with strength where needed.

F. C. Burk asked about visibility through plexiglas and about scratching of the surface and also about the effect of sunlight on the material. Mr. Zarger answered that observation turrets have seen service on aircraft in Libya and that complaints have not been received, but a case was reported of an airplane, on the ground, that was caught in a dust storm and had its windshield so badly scratched as to obscure vision. However, abrasives and polishing material can be used to restore transparency.

A question about plastic automobile bodies was briefly answered from the floor, to the effect that in Ford's experiments a slurry of fiber, plastic and solvent has been felted, using a vacuum through a screen of the desired shape. The felt is subsequently dried and cured to produce the body panels.

The speaker had on display a large number of plexiglas objects to show the beauty and versatility of the material.

## Emergency Truck Plan Proposed by F. C. Horner

■ Pittsburgh

"I am confident that within a short time we will have comprehensive and yet practical plans for meeting any emergencies that may arise in the field of motor-truck and motor-bus transportation, and which in an emergency can be put into effect on short notice." That is the reassuring statement made by Frederick C. Horner, consultant on transportation to the National Defense Advisory Committee, in a speech before 200 members and guests of the Pittsburgh Section, at the first fall meeting, held in the Mellon Institute, Sept. 23.

"Truck Transportation in England Under Fire" was the title of the talk in which Mr. Horner advocated taking advantage of the truck and bus transportation lessons England has learned while actually under fire, in organizing American truck and bus transportation for speedy change-over to a war footing, should such action be necessary. Mr. Horner spent 27 days in England last winter studying transportation problems under war conditions, as a member of the Civil Defense Mission of the U. S. War Department (May SAE Journal, p. 18).

Major Frank M. Roessing, Pittsburgh's Director of Public Works, also spoke. He had just returned from England after studying the effects of bombing on highways, water supply, telephones and similar public utility functions, for the Committee under Mayor F. H. LaGuardia, U. S. Director of Civilian Defense, and had some fresh views to offer the Pittsburgh Section gathering on this subject.

What the U. S. truck industry should do in preparation for emergencies was clearly outlined by Mr. Horner. "Planning by the truck industry of the United States should include study of the ports and large terminal and industrial areas where congestion of

# SAE WEST COAST REGIONAL TRANSPORTATION and MAINTENANCE MEETING

FAIRMONT HOTEL • SAN FRANCISCO, CALIF.

NOV. 5-6

## • P R O G R A M •

### Morning Session

NOV. 5

C. F. Becker,  
Chairman

T and M Activity of the SAE  
— S. B. Shaw, Pacific Gas and Electric Co.

T and M Local Activity of the SAE  
— Peter Glade, Purity Stores, Ltd.

Bearings for Heavy Duty Automotive Engines  
— A. B. Willi, Federal Mogul Corp.

Factors Influencing the Choice of Heavy-Duty Lubricants  
— Dr. I. R. Stirton, Union Oil Co. of Calif.

### Afternoon Session

NOV. 5

F. C. Patton,  
Chairman

Taxi Cab Fleet Maintenance  
— L. A. Schroyer, Yellow Cab Co.

Chromium Plating  
— E. W. Templin, Department of Water and Power, Los Angeles

Manufacture and Maintenance of Aircraft Engines  
— J. Caffrey, Wright Aeronautical Corp.

### Morning Session

NOV. 6

Earl A. Marks,  
Chairman

Relation of Motor Vehicle Inspection to Fleet Operation  
— J. Verne Savage, Municipal Shops, Portland

Butane Fuel for Automotive Engines  
— H. A. Reinhart, Butane Division, Pacific Truck Service

Supercharged Motors for Highway Transport  
— Peter Glade, Purity Stores, Ltd.

### Afternoon Session

NOV. 6

T. C. Howe,  
Chairman

Magnaflux in Automotive Maintenance  
— Hamilton Migel, Magnaflux Corp.

Open forum and round table discussion

### Evening Session

NOV. 6

### Regional Meeting Dinner

C. F. Becker,  
Chairman

#### Presentation of guests

Behind the Scenes in National Defense Engineering  
— A. T. Colwell, Thompson Products, Inc., and President, SAE

The SAE in National Defense  
— John A. C. Warner, Secretary and General Manager, SAE



transportation facilities and disruption of distribution services are most likely to occur when the all-out effort begins hitting on all cylinders, and also in the event that this country is attacked. When the critical areas are determined, steps should be taken to plan the formation of pools of trucks that would be called into being at the first indication of a developing transportation emergency. If we are attacked, these pools would be called into being and stand in readiness to furnish emergency aid to bombed areas, and supplementary aid to military forces if they found such assistance imperative."

Concerning managerial control of pools, the speaker said, "Control of a pool should not be in the hands of committees or in the hands of bureaucrats. It should be vested in a man with brains and ability, a man who knows truck transportation, and that man should be given a free hand to pick his staff of advisers and be given dictatorial powers in the operation of the pool. Committee haggling is just another form of congestion."

"But before the industry can make plans for the establishment of pools, it must know what sort of vehicles are available for pooling purposes," he stated. Mr. Horner deemed essential a census of trucks which would reveal the types of body equipment in use and the load capacity of the equipment; the amount of equipment garaged; the number of trucks all classes of truck owners have in reserve to take care of traffic peaks, and what vehicles of that reserve they would make available for pooling purposes. "This reserve should be cataloged," Mr. Horner emphasized, "and for the duration of the emergency the catalog should be kept up-to-date."

The inventory of commercial motor vehicles is already underway, Mr. Horner said, and in a few months we should begin to obtain some "very revealing and exceedingly useful figures" on which to base certain conclusions with respect to what we have available in truck and bus equipment throughout the whole country.

The speaker said that he realized the pooling idea is a radical one, that he had not begun to cover the many organizational problems involved in such an operation, but that "we must discuss those problems NOW and solve them in such a manner that we will be able to handle the emergencies that will inevitably arise."

Major Roessing described the effects of bombing on England's public utility systems, and stressed the importance of forming gas pools and electric pools in this country, so that these public utility functions would be as well organized, for the purposes of National Defense, as the telephone companies.

## Colwell and Young Talk Defense and Air Engines

■ Detroit

SAE President A. T. Colwell and Raymond W. Young, chief engineer, Wright Aeronautical Corp., were speakers at the Sept. 22 meeting of the Detroit Section. Mr. Colwell developed further the defense themes he has been emphasizing at various Section meetings this year, the title of his Detroit talk being "What the SAE Is Doing in the Present Defense Program." Mr. Young presented "Design Features and Performance Characteristics of the Mercedes-Benz DB-601A Aircraft Engine," the paper which was printed in full in the October, 1941, SAE Journal.

# Service Problems Created by Defense Attacked by Mechanical Forum Speakers

■ Northwest

- Extending the service life of automobile engines and parts through elimination of vibration now that the national emergency demands using cars longer than in the past. . . .

- Discussion of modern trends in carburetion as an engineering guide to further refinements now that need for fuel conservation is a reality. . . .

- Practical rules for servicing roller and ball bearings. . . .

- Frank appraisal of the responsibilities of service management and men in producing high-caliber ignition repair jobs. . . .

These were subjects covered in the big four-paper panel of the Northwest Section's Fall Mechanical Forum, held Sept. 11, in Crawford's Seafood Grill, Seattle, Wash.

"In the next three to five years necessity will force us to use engines for longer periods than we have in the past," declared Harold O. Hanawalt, Balancing Service Co., in his paper "Elimination of Vibration." "With longer use," he said, "comes greater vibration caused by the following parts: renewed bearings, reground crankshafts, clutch repairs, universal renewals, driveshaft bearings, wheels and brake drums, pistons and rods."

Mr. Hanawalt pointed to unbalance as a cause of much vibration, with rpm the primary consideration. Secondary consideration is diameter, while elements such as weight, structure, length, and similar characteristics all have a definite bearing on the ultimate effect, forum engineers and guests were told.

Dealing more specifically with conditions which produce vibration in motors, Mr. Hanawalt said that not enough attention is given to drive shaft unbalance—a condition which causes much harmful whipping. Common cause for unbalance is timing, and this item should be carefully checked before attempting to look for other causes, Mr. Hanawalt concluded.

## Improved Carburetion

Improvements in carburetion mixtures have been obtained by means of more efficient distribution, carburetion and manifolding, higher antiknock and volatile fuels, and better design and materials used in motor construction, according to Harry Kuhe, Ethyl Gasoline Corp., in his chart-illustrated talk, "Modern Trends in Carburetion."

"Over a thirteen-year period," Mr. Kuhe said, "average air-fuel ratios have increased by about two units to realize an economy of 18% on gasoline consumption. From 30 to 70 mph, we approach the theoretical optimum air-fuel mixture and losses have been reduced to 5% or less at speeds in excess of 25 mph."

Engineers of a decade ago were aware of the advantages of lean mixtures, Mr. Kuhe stated, but were deterred from putting them into effect, not only by the lack of uniform distribution, but also by the characteristics of the engines built at that time. For example, he pointed out, in engines built during the past thirteen years the power output

has been increased by some 80%. In 1927, an automobile needed all of the horsepower available, and the air-fuel ratio was naturally kept down to the 12 to 13 figure. Even today, if full power is needed at low speed with wide open throttle, mixtures will drop to the 12½ to 13½ to one level, Mr. Kuhe told the engineering audience.

The hazard of burning engine parts must also be given consideration in analyzing carburetion efficiency, Mr. Kuhe said, adding, with lean mixtures and poor distribution, the excess oxygen is liable to attack metal during the process of combustion. Result: pitted cylinder heads, burnt plug points and valves. Thirteen years ago, valves were made of ferrochrome or lower quality steel, which simply would not stand up in an oxidizing flame.

The antiknock value of gasoline was another factor Mr. Kuhe dwelt on, as influencing the air-fuel ratio that can be used. Detonation can be reduced materially by rich mixtures and by the cooling effects of the unburnt gasoline, he said. This has been proven on many a fleet account on which Mr. Kuhe and other engineers have worked—with higher octane fuel and leaner mixture. But when it was attempted to revert to a lower antiknock gasoline with the same carburetion, the speaker recounted, burning of valves frequently took place. Corollary to antiknock value also is the improved cooling systems of present-day engines, enabling the use of leaner air-fuel mixtures, Mr. Kuhe said.

Truck and bus motors have in general followed the same trend toward leaner carburetion as passenger cars, Mr. Kuhe pointed out, adding, progress has not been so rapid because the nature of truck work requires more full load wide-open throttle conditions.

In conclusion Mr. Kuhe emphasized that—while improvement in fuel economy is definitely a function of better carburetion, and calibration of this instrument—it must not be forgotten that compression timing and other tune-up adjustments are equally important factors.

## Bettering Bearing Service

More than 95% of all ball bearing troubles investigated result from defective mounting, improper operating conditions and similar causes which can usually be detected by visual inspection of the bearing, Edward B. Williamson, Bearing Sales and Service, informed the engineers in a talk entitled, "Anti-Friction Bearings." He referred to results of tests recently conducted in Seattle by a large manufacturer to substantiate advertising claims of various bearing makers.

Mr. Williamson said many people had asked him why it is that one manufacturer shows a different capacity than what another shows, although the two bearings may be the same in every respect. To learn the truth behind advertising claims, tests were conducted in which the speaker participated. "One manufacturer stated his bearing would stand ten thousand pounds at a certain speed and another maker gave the capacity at less than half of this figure," Mr. Williamson said. "The results of our test showed an

average breakdown of all bearings at slightly over six thousand pounds. The manufacturer in this case who advertised the lower capacity showed the higher capacity in actual test. . . . Some day I hope all manufacturers will use the same method and the designer and buyer will have a better understanding of what they are doing."

In reference to the greater reliability of ball and roller bearings partly from their less exacting lubrication requirements, Mr. Williamson declared: "The plain bearing must have a comparatively large amount of oil correctly applied to maintain the oil film. This is essential to its performance as a bearing. With ball and roller bearings, lubrication is not so vital as it is not directly connected with the load-carrying capacity. Thus the use of anti-friction bearing removes the need of constant watchfulness that the plain bearing calls for."

Causes of bearing failures Mr. Williamson listed as: failure of lubricant at source or contamination, excessive loads, cramped bearings, off-square (causes heat at retainer), and heat from external source.

Analyzing ignition, Walter Crane, Pacific Highway Transport, charged that the biggest cause of failure in modern ignition systems comes from inefficient application of proper principles and the correct use of instruments.

Fleets still experience some difficulty in obtaining the complete operating data necessary for the particular type of operation encountered, Mr. Crane said.

Management in many cases has not yet assumed its responsibility in providing needed equipment so that properly trained mechanics can give in return the highest caliber work, Mr. Crane declared, adding that, in many instances the men doing the work have not taken advantage of all data available to them. The industry needs more men who will assume responsibility for starting the work assigned to them and follow through to a correct conclusion, the speaker concluded.

Attendance at this Fall Mechanical Forum and dinner was 52. Prominent discussers of the panel papers included: Maurice Kane, C. O. Karr, Harley Drake, and Theodore Howe.

## Higher Temperatures Aid Gasoline Economy

■ So. New England

That the average motorist could not have an accurate knowledge of gasoline mileage, and that, indeed, the determination of gasoline mileage with sufficient accuracy for the purpose of making practically significant distinctions among commercial fuels is hardly possible, emanated from data presented by W. S. Mount of Socony-Vacuum Oil Co., in a talk before Southern New England Section, Oct. 8. The paper was entitled, "Factors Affecting Gasoline Consumption."

In the course of his presentation, and in answer to many questions, Mr. Mount showed the advantages in economy with sufficiently high temperatures of engines and transmissions (temperatures considerably higher than usually obtained in conservative city driving); with air-fuel ratios well on the lean side; with driving in high gear; with use of express highways; and with designs incorporating "free-wheeling" or overdrive.

This, the first meeting of the Southern New England Section for the fall season, was held at the Hotel Bond, Hartford, Conn.

## Canadian War Output Threatened by Strikes

■ Canadian

"So long as the government of Canada tolerates illegal strikes it is just playing at war," said Louis Blake Duff, president, Niagara Finance Corp., in his address as guest-of-honor speaker at the annual Hamilton meeting of the Canadian Section, held in the Hamilton Golf and Country Club at Ancaster.

"While the world burns," he charged, "our government fiddles with a labor problem that is the product of a small subversive group of racketeers. This is not tolerance: it is craven weakness." He paid a high tribute to the Canadian automotive industry, 75% of the greatly increased production capacity of which is devoted to war work.

"Industry," Mr. Duff said, "is doing a gigantic job." He declared that it will require a total effort of the democracies to defeat Hitler with the arsenals, shipyards, resources and man power of Europe at his command.

Section Chairman R. W. Richards presided. Other guests of honor were SAE President, A. T. Colwell, and Penfield Seiberling, president, Seiberling Rubber Co.

The meeting, which established a new high in attendance and interest for a Hamilton gathering of the Section, was preceded by an informal golf tournament in which those who could find the time participated.

SAE President Colwell conveyed the greetings of the Society at large to the Canadian Section and indicated that the tools-of-war production achievements of industry in the United States to date are but a light overture to the drama of production that impends.

Frank M. Morton, vice president and general manager, International Harvester Co., of Canada, extended a cordial civic welcome to the guests.

Past-chairman Norman H. Daniel requested Mr. Colwell to express to the Council of the Society the grateful appreciation of the Section for its gracious resolution lament-

ing the passing of Robert H. Combs, "the father of the Canadian Section."

Chairman Richards on behalf of the gathering thanked F. Martin Buckingham, Treasurer of the Section, and general manager of Wallace Barnes, Ltd., for his hospitality as host of the meeting.

## Armed Forces Get Priority on High-Octane Gasoline

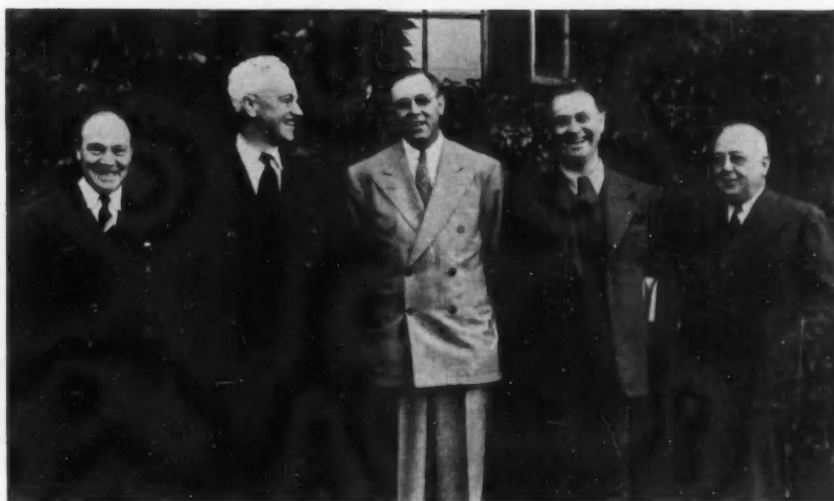
■ Metropolitan

"Immediate effect of the present emergency on gasoline may be to force end points higher and octane numbers lower to increase yield, especially in view of Atlantic seaboard crude shortage crisis." . . . "Fuel demands of the armored forces as well as military aviation may result in the diversion of the highest octane number stocks now available to these users." . . . "Defense preparations will accelerate new developments and make available fuel types which would normally require years to produce." These and other striking statements were made by J. O. Happel, engineer, Technical Service Division, Socony-Vacuum Oil Co., one of two authors of the paper "Manufacturing Gasoline for Modern Engines," delivered before approximately 175 members and guests of the Metropolitan Section, Oct. 16, at the Park Central Hotel. Co-author W. M. Holaday, automotive research engineer, Socony-Vacuum Oil Co., delivered the first portion of the paper.

"Research activities are now stimulated by the struggle for fuels of higher quality to give greater power, flexibility and operating range of military equipment." Mr. Happel said, "The eventual result will probably be the formulation, at a price, of an ultimate gasoline. Special fuels will be available for purposes where high outputs are required and cost is not a primary consideration. They may be used to a limited extent in ordinary motor fuels, but it is likely that for some time to come the most economical powerplant combination will require an engine capable of using to the best advantage fuels of present-day quality."

To operate some 32,000,000 motor vehi-

## Canadian Section Heads Greet SAE President



Pictured above, from left to right, are: F. M. Buckingham, treasurer of the Canadian Section; Warren B. Hastings, secretary; A. T. Colwell, president, SAE; R. W. Richards, chairman of the Canadian Section; and John H. Hickey, vice chairman.

cles registered in the United States today, the petroleum industry must produce more than a million and a half barrels of gasoline a day, it was pointed out. The most common conversion process, thermal cracking, is responsible for the production of about half of the 600 million barrels of gasoline produced in the United States annually. About 30 million barrels of cracked gasoline are produced by the catalytic process each year and the use of this type of operation is being rapidly extended, Mr. Happel reported.

Refinery processes and fuel components were described in detail. Subjects covered: distillation, thermal cracking, catalytic cracking, reforming, vis-breaking and coking, light ends recovery, polymerization, alkylation, treating, and tetraethyl lead.

The refiner's problem was seen as "not only the manufacture of gasoline to meet a variety of automotive requirements, but the production of sufficient quantities of fuel with the greatest economic efficiency."

Judging from customer reactions and complaints, the average car owner is most interested in performance, Mr. Holaday said, adding that satisfactory performance includes smooth, knockless operation and full power output, freedom from vapor lock at summer temperatures, rapid warmup in cold weather, easy starting and good acceleration. Of the many gasoline characteristics in which the consumer is interested, Mr. Happel said later, a limited number are subject to close control by the refiner. The most important of these are antiknock quality, vapor pressure, and distillation.

Mr. Happel said the refiner's controls over antiknock quality are (1) selection of crude oil, (2) choice of refining processes, and (3) regulation of the addition of tetraethyl lead. Vapor pressure is controlled by varying the content of high vapor pressure components present in the gasoline, and volatility control is obtained in distillation and stabilization equipment following cracking operations, he stated. Refinery conversion operations are usually controlled primarily for octane number production and yield of product, since it is found that these items are of greatest importance in refinery economics, Mr. Happel said.

Fifteen prepared discussions by some of the finest fuel minds in the country, followed the Happel-Holaday paper. As all the experts agreed that the authors had done such a remarkable job in covering their subject that it left little to criticize, the discussers talked on related topics. Subjects included: vapor lock, preignition, acids in gasoline tanks, engine re-design, Army petroleum needs, and similar items.

Highlight of the prepared discussions was a review of Army petroleum needs by Capt. C. E. Cummings, Office of Chief of Ordnance, U. S. Army. That the Army has first call on high-octane gasoline for its planes, tanks, and automotive land forces, was made clear by Capt. Cummings. There is one grade of gasoline for Army motor vehicles, the discussor said, and the octane rating of this fuel is dictated by the most critical consumer.

Need for the petroleum industry to produce larger amounts of gasoline is essential because of loss of a portion of energy through venting, poor carburetion, poor distribution, and similar energy-wasting units in Army vehicles, Capt. Cummings said. To help fuel conservation he suggested using fuel injection systems.

Dr. R. E. Wilson, president, Pan American Petroleum & Transport Co., answered the question commonly asked by the layman:

## All-Time High Reached in Membership Applications

All previous records have been shattered in the number of candidates applying for membership in the SAE, according to membership department reports for the Society's 1940-41 fiscal year ending September 30. Applications for membership and reinstatements for that period numbered 1272 - shading the 1928-29 record of 1265 and showing a 37% increase over the total for last year.

Total membership of the Society, as of September 30, was 7737, just under the year-end record of 7760 reached in 1931. At the present rate of growth this figure will be surpassed in the near future.

"Expanding SAE Activities combined with full cooperation of Section and National Membership Committees may be credited for this record showing," said John A. C. Warner, SAE Secretary and General Manager, in commenting on this achievement. He forecast that this mark will be bettered in the new fiscal year now under way.

Section Membership Committees or SAE Headquarters will give every attention to eligible prospects for membership. Application blanks and membership material may be received from the Society's Headquarters at 29 West 39th St., New York.

"With all the new scientific inventions and processes why isn't there something to replace petroleum?" Theoretically supposing that there was no petroleum and scientists had to make a fuel that could do the same job, Dr. Wilson took basic known elements and told what the scientists might do. The answer: there is no substitute for petroleum.

A. E. Miller, process chemist, Sinclair Refining Co., suggested redesign of the automobile engine as an aid to improved performance through reducing engine knock. Giving the aviation engine as an example of what can be done by redesign, Mr. Miller

stated that if manufacturers invested \$2 to \$3 more per engine, the same road performance could be obtained, and lower antiknock characteristics would save the driver from \$12 to \$20 a year.

Another advocate of improving engine design as a means of better performance was discussor R. J. S. Pigott, staff engineer, Gulf Research & Development Co. He suggested, among other things, improving manifolding, venturi, cooling; slowing down the rear axle, and using oil-cooled pistons.

Vapor lock is not just a summer phenomenon, according to A. J. Blackwood, research engineer, Standard Oil Development Co., in discussing fuel system hindrances. Some vapor lock forms on warmest winter days, Mr. Blackwood said. In speaking about the customer's ability to recognize knock, Mr. Blackwood indicated that most drivers were unable to judge knock, as indicated by tests conducted by the American Petroleum Institute. Knock characteristics vary in different cars though the same fuel is used, Mr. Blackwood said, rendering the knock phenomenon difficult to analyze.

A. L. Clayden, experimental engineer, Sun Oil Co., said that the current trend in fuel technology is toward making pure hydrocarbons but that such development is still far off. An API committee is making a study of antiknock hydrocarbons at Ohio University, Mr. Clayden said. They are trying to get prices down for special applications.

Mr. Holaday, in answer to Mr. Miller's question on the importance of judging fuels by their octane numbers, said that as different standards of octane rating are used by different laboratories, such ratings are only relatively correct. The speaker felt that volatility was the best means of judging fuels.

Lower octane numbers and increased gasoline yield were advocated by petroleum pioneer F. C. Burk, supervisor of automotive laboratory, Atlantic Refining Co., to meet gasoline shortages now and in the future. Sulfur in gasoline is not serious as a corrosive acid, Mr. Burk said later in his talk, adding that West Coast fuel has high sulfur content; East Coast fuel a minimum of sulfur. These statements were later corroborated by Mr. Holaday.

Citing the work being done by the CFR

## Chicago Section Governing Board Takes A Bow



(Left to right) G. W. Johnson, Bowman Dairy Co.; L. B. Gilbert, chairman, White Motor Co.; R. J. Temple, Lincoln-Boyle Ice Co.; J. A. Moller, Pure Oil Co.; P. H. Oberreutter, Mid-West Dynamometer & Engineering Co.; J. T. Greenlee, Imperial Brass Mfg. Co.



Committee toward producing a single method of rating gasoline, A. B. Culbertson, manager, Products Application Department, Shell Oil Co., Inc., pointed out the variations between laboratory testing and actual road testing. Mr. Culbertson said octane numbers cost money. About 100 million dollars were spent to raise gasoline fuel 10 octane numbers, he stated.

That customers are not knock-conscious was verified by L. Raymond, supervisor, Automotive Laboratory, Tide Water Associated Oil Co. Mr. Raymond also condemned the wide variation in laboratory ratings of octane numbers.

E. H. Fezandie, associate professor in Mechanical Engineering, Stevens Institute of Technology, said when he went to school, experts were saying the petroleum resources of the country would be exhausted forty years hence. Today it has been projected another 40 years. He questioned Mr. Holaday on the future prospects as he saw them. Mr. Holaday said by 1981 there would probably be another 80 to 100 years added to the predictions.

## Colwell Reveals Defense Progress

■ St. Louis  
■ Indiana

The aircraft industry must grow greater than the automotive industry, and the tank industry must grow as large as all of General Motors production of cars is today, to fulfill America's defense demands. Thus, SAE President A. T. Colwell summed up the tremendous job ahead of industry in his revealing paper, "Behind the Scenes in National Defense Engineering." The talk was delivered Sept. 8, before the Cleveland Section, Cleveland Club; Sept. 23, before the Indiana Section, at the Antlers Hotel, Indianapolis; and again on Sept. 24, before the St. Louis Section, at Candlelight House, Clayton, Mo. Mr. Colwell told the part engineers are playing in the vast armament program and just what defense progress has been made to date. SAE Secretary and General Manager John A. C. Warner also spoke at these meetings, outlining SAE activities in connection with the defense program.

## Travels 225 Miles to Hear Colwell Speak

From the St. Louis Section comes the news that George L. Gaston, automotive engineer, Standard Oil Co. (Ind.), traveled 225 miles to hear SAE President A. T. Colwell speak. What's more he enjoyed the talk, was glad he came.

## Chicagoans Stage Golf Tournament

■ Chicago

The Chicago Section's 1941-42 season opened with a Golf Tournament at Tam O'Shanter, recent scene of the \$10,000 National Open Golf Championship which attracted largest galleries seen on American fairways (36,000). The event drew a turnout of over 100, with 22 foursomes competing for 65 prizes. Initiating the new regime of Chairman L. B. Gilbert, White Motor Co., the outing was held under the direction of R. J. Temple, Lincoln-Boyle Ice Co., and his entertainment committee.

# SAE Tractor Meeting (Continued)

(from page 39)

long been recognized," it was explained. "The design has been reduced to the simplest possible expression. The guides are integral with the cross members. The more complicated interlocking guides used in the other two types have been abandoned in favor of the simpler design. This is made possible by operating the track under tension to offset the torsional and lateral flexibility."

Because the success of this type drive is based upon the possibility of maintaining sufficient tension on the track to prevent slippage under all conditions, these authors explained, the drive would be impractical on an undercarriage such as that of the half-track scout car, where the track tension varies with the deflection of the bogie spring.

Tests of the drive found no slippage when wet clay was fed on the face of the driving wheel and the tracks were slipped on dry concrete, and, under these conditions, the best possible traction prevailed between the tracks and the ground and the worst between the track and the drive. While friction drive rubber tracks, using fabric reinforcement, were tried and found unsatisfactory in the past, the steel cable reinforcement of the Goodrich track has overcome this limitation, it was explained.

One of the primary advantages of the rubber tracks is the saving in power, it was pointed out. A considerable amount of power is lost in a steel track as the result of friction in the joints, friction between roller flanges and the guides and because of excessive vibrations.

"It can be said that for all practical purposes, the loss of power due to friction in the joints is entirely eliminated by the Goodrich rubber track," it was claimed. A slide to bear out this statement showed an efficiency curve of the track being operated as a belt on a dynamometer. The speed was 30 mph with an initial tension of 1000 lb and a load of 35 hp, the efficiency was 97%. A part of the 3% loss could be attributed to windage, the others commented.

Vibration losses are greatly reduced by the rubber track, particularly where rubber bogie wheels are used. Also possible is a saving of power, which, according to tests by the company, reached about 40% at 30 mph. The savings, it was said, increase with speed, because the friction losses in the joints increase with the centrifugal force, which in turn is proportional to the square of the speed. In addition to the power saving at the high speed, tests also showed a substantial saving at the lowest speed.

"The ability of the rubber track to develop traction with comparatively small slip is invaluable," Mr. Mayne and Mr. Delzell pointed out. "When a tire is operated at 17% slip, the same proportion of the available draw-bar power is lost. If a track can develop the same torque at one-third this slip, the loss is thereby reduced at the same ratio."

## Tractor-Implement Cooperation

Necessity of still greater cooperation between tractor and implement engineers to enable "interchanging" of the products they design and produce, was urged in the paper

"The Relationship Between Tractor and Implement Engineering" by Theo. Brown, Deere & Co. He pointed out that because animal power on the farm is steadily being replaced by mechanical power, the scope of the tractor must be widened to meet all needs for power.

This paper commended the recently compiled set of standards for power-shaft location which resulted from the joint efforts of tractor and implement engineers. This set of standards, when accepted, will make it possible for one set of power shaft connections to properly connect any tractor to a given power shaft driven implement, Mr. Brown said.

"In order that a tractor may displace horses on the farm, it must be capable of doing the work that horses accomplished. Therefore, cultivation of row crops for one thing by tractor power is imperative. The advent of the general purpose type tractor followed and marks the point where there was need for the closest cooperation between tractor and implement engineers," Mr. Brown pointed out.

Discussing the necessity of a tractor capable of adopting the various implements to itself, Mr. Brown pointed out that "a tractor of itself is nothing. It is the means to the end. It furnishes the power necessary to operate some piece of equipment. It would seem, therefore, that tractor engineering must embrace more than good automotive practice. A tractor might be designed to be a perfect piece of mechanism when considered alone, but from the user's point of view be a failure. So it is that every successful general purpose tractor represents a compromise between automotive and implement engineering."

"Therefore," Mr. Brown concluded, "it naturally follows that there must be closer cooperation and understanding between the tractor engineers and implement engineers."

Discussion on this paper was in charge of C. E. Frudden, Allis-Chalmers Mfg. Co., L. B. Sperry and R. Orelind, of International Harvester Co., and Elmer Baker, also of Allis-Chalmers, who substituted for C. J. Scranton of that firm.

Commenting on the paper, Mr. Frudden agreed that there must be a closer cooperation between tractor and implement engineers if tractors are to definitely replace the horse on farms, especially the smaller farm. He pointed out that whereas there were only about 5000 tractor-drawn corn planters sold, 45,000 horse-drawn implements of the same nature were sold in one year, principally because the tractors were not designed sufficiently well to allow adoption of such an implement. It is his belief that there is a definite trend towards mounting tools on tractors, and that in time to come the implements of one manufacturer will not only fit one particular tractor, but will be easily interchangeable to a tractor of some other make.

Standardization of implements to enable quick and easy changing or "interchanging" was also urged by Mr. Baker, who pointed out that the job of the implement engineer is somewhat more difficult than that of the tractor designer because of the hundreds of different types of instruments necessary to meet the requirements and demands

from the various agricultural sections of the country.

Standardization is also deemed important by Mr. Orclind who pointed out that the successful designing of implements depends largely upon the tractors to which they would ultimately be attached. He also urged that accessories, such as oil cleaners, and similar equipment, be eliminated from side mounting to the tractor, and that the tractor engineer design the equipment in such manner that implements can easily be attached.

While agreeing with previous speakers, Mr. Sperry contended that the remedy for the present differences between implement and tractor design is not entirely the problem of the tractor engineer, but that the implement men should make more efforts to cooperate in arriving at a suitable compromise in involving present differences in design. He said that the draw bar and hitch standardization will eliminate a lot of difficulties in fitting implements to tractors, and predicted that in time it will be necessary to remove only two or three pins to make a change from one to some other implement on the tractor.

#### Earth-Moving Equipment Analyzed

"The problem of earth moving is more important to the present National Defense program than most people realize," George W. Mork, engineer in charge of the Bucyrus Erie Co. tractor equipment division pointed out in his paper "Comparisons of Methods and Costs of Earth Moving."

It is important, "for in its scope is included not only that excavating which is inherently necessary for highways, cantonments, airports, ammunition dumps, new factories and all the other construction work, but also mining of iron, copper, nitrates, coal, and other raw materials."

The importance of the tractor, truck, shovel, and other excavating material is greatly enhanced by the fact that approximately 60% of all iron ore mined today is done in open pits with power shovels and tractor drawn units, a situation that is also prevalent in obtaining other important raw materials today.

In discussing the contention of his paper that present day earth-moving equipment has greatly reduced the costs of operations, Mr. Mork reviewed the four most popular present day means of moving dirt: tractor and scraper-tractor, scraper and pusher tractor, rubber tired tractor scraper and pusher tractor, and power shovel, truck and bulldozer for spreading.

"The first method shows the best costs for short hauls, the length of the haul being computed as the distance between the mid-points of loading distance and the mid-point of dumping and spreading distance. The second method produces the lowest costs for medium short hauls, the third for medium long hauls and the fourth for long hauls," Mr. Mork said, illustrating his points through numerous slides.

"Considerations which enter into the selection of equipment include, not only the cost," he stressed, "but also the materials to be handled. It is true that for the conditions selected, the rubber tired unit of 8.2 cu yd capacity with pusher tractor shows the lowest cost. However, digging conditions may be such that the largest possible tractor procurable is required to obtain the necessary power to load efficiently." Therefore, Mr. Mork concluded, in properly selecting equipment for a particular job, comparisons of cost and power requirements must be carefully made in order to do the

work in the most economical manner within the time allotted.

Lower costs in earth moving during the past few years were credited to the introduction of diesel engines both by Mr. Mork and by discussers, including J. M. Davies, Caterpillar Tractor Co., and J. T. Liggett of the Allis-Chalmers Mfg. Co.

Another factor in lowering the cost was the introduction, about 1935, of the self-loading scraper. "General improvements in design of this equipment in recent years have greatly reduced the cost of such operations," Mr. Davies commented.

Commenting on this paper, Mr. Liggett urged that more attention be paid to the effect of grades on the jobs as a means of reducing the costs which oftentimes are boosted by extensive repair of equipment. Also important in holding down costs, he said, is keeping the equipment rolling; more careful handling to reduce the time-out necessary for repairs and the cost of repairs and having the equipment available at all times.

#### Hunting Substitutes for Substitutes

H. B. Knowlton, International Harvester Co., in his paper on "The Selection and Use of Substitute Materials," as well as H. Bornstein, Deere & Co., and T. M. Logan, Caterpillar Tractor Co., discussion leaders Friday afternoon, decried the lack on definite information relative to substitutions for iron, steel, and other important metals and materials in production of tractors and similar equipment. It was pointed out that this condition was making it necessary for them to "use substitutes for substitutes," with the result that production in general is being disrupted.

It was also pointed out that much "priority" difficulty in the industry could be greatly alleviated in view of the fact that more than 50% of the important materials used by the industry, such as iron, copper, zinc, etc., do not have to be imported from other countries but is available in the United States.

It was stressed that the industry could adjust itself by redesigning and by new designing so that metals and other materials of lower quality could easily be used without reducing the quality of the equipment being made.

"There is always some place we can go to get material or substitutes if someone would only tell us where," Mr. Bornstein commented in his remarks relative to the uncertainty of the substitute picture from day to day. "It's aggravating to know that this country has a lot of its own natural raw materials, but that it is not able to produce enough of them."

"One redeeming factor of the entire unsettled picture because of 'priorities' is the fact that a closer cooperation will result between the engineer, metallurgist, and the production departments as each makes an effort to meet the rapidly changing situation," Mr. Logan commented.

## Plastics to Rival Steel in Two or Three Decades

■ Baltimore  
■ New England

Prediction that the plastics industry would rival such a big unit as the steel industry in two or three decades, was made by H. A.

Frommelt, director of industrial research, Kearney & Trecker Corp., Milwaukee, in a fact-packed talk at the Baltimore Section, Oct. 2, and again before the New England Section, Oct. 8.

"Today they are making plastic cartridge shells for Defense," Mr. Frommelt said. "Of four major types of plastic from which these shells are being made today only one is synthetic. Brazil chemists are making plastic from coffee beans now and that will mean instead of dumping tons of beans into the sea to keep from flooding the coffee market, the excess production can be absorbed."

## Golf Party Opens Fall Section Meetings

■ Milwaukee

First of the fall meetings of the Milwaukee Section was a golf party on Sept. 12 at the Beloit Country Club, Beloit, Wis. Eighty-five members and guests enjoyed the golf under ideal weather conditions, and over 100 members and guests were on hand for the dinner which was sponsored by Fairbanks, Morse & Co., Highway Trailer Co., Madison-Kipp Corp., Nelson Muffler Corp., Rockford Drilling Machine Div., Warner Electric Brake Co., and Yates-American Machine Co.

The new Milwaukee Section chairman, Prof. Grover C. Wilson, presided during the after-dinner talks and the introduction of the Governing Board. A large number of prizes generously donated by over 30 firms were distributed. The new Section membership chairman, N. B. Nelson, won the first leg on the new loving cup for low gross score.

## Military Needs Bring New Uses for Rubber

■ Indiana

Combat tires that can run 50 to 100 miles flat, yet retain original stability and control; self-sealing airplane fuel tanks that close up bullet holes as soon as they are made; aircraft emergency life rafts of one, two, four or seven-man capacity that automatically inflate when dropped from a plane into the water—these were a few of the exciting new rubber developments described by E. Waldo Stein, sales engineer, Firestone Tire & Rubber Co., before approximately 230 engineers, at the Oct. 9 meeting of the Indiana Section, Hotel Antlers, Indianapolis.

The nine items disclosed by Mr. Stein were chosen from hundreds of new uses for rubber for military purposes, the full story of which cannot be told until the existing emergency has passed.

Due to the present emergency synthetic rubbers can be used in place of natural rubber, Mr. Stein said. There has been sufficient experience with pilot plants making synthetic rubber so that it can be truthfully said that engineers could build enough synthetic plant capacity to handle rubber demands for the emergency. However, to produce enough synthetic rubber to replace natural rubber imports of 87,916 tons per month would require a capital investment of approximately one and one-half billion dollars.

Rubber research has moved through three major channels to make possible the rubber products as we know them today, Mr. Stein declared: vulcanization—treating rubber by chemical means to improve its strength,

elasticity, and similar useful physical properties; carbon black to increase rubber hardness; and anti-oxidants to increase the rubber's resistance to heat.

Other developments described by Mr. Stein were special rubber buoys for radio-controlled seadrome contact lights to mark landing fields on the water; rubber tank tracks and half tracks; bogie rollers for tanks; life belts that can float an unconscious man on his back and provide a means of supporting his head out of water; airplane tires suitable for take-off and landing on soft fields; and rubber latex parachute cushion seats.

## U. S. Fighting Forces To Be World's Greatest

■ **Buffalo**

Our new Army will be better equipped than any other and will be the fastest and hardest striking force ever assembled, able to utilize or to repel the new weapon "mechanized penetration." The Navy, thanks to air power, is now able to achieve the dream of all naval strategists—"the ability to compel a reluctant enemy to fight."

These heartening statements were made by SAE President A. T. Colwell, in a newly-revised, illustrated talk entitled, "Behind the Scenes in National Defense Engineering," delivered at the first meeting of the Buffalo Section for the season. This meeting, held jointly with the American Society of Tool Engineers, took place Oct. 15, at the Westbrook Hotel.

John A. C. Warner, general manager and secretary, SAE, spoke briefly upon the work of the Society in defense.

Mr. Colwell startled his audience with facts on the tremendous size and scope of the defense undertaking. The airplane industry must become larger than the automobile industry; the bomber program alone equals our entire automobile capacity; and the tank program equals all General Motors capacity. "If criticism is made that the program is behind schedule," Mr. Colwell said, "it must be remembered that we started only a little over a year ago. The truth is that the industry is doing a magnificent job!"

Our present designs of fighters and bombers are the finest for performance and quality to be found in the world today, Mr. Colwell stated, with speeds of 300 mph or over for bombers, 400 mph for fighters, and a climbing rate of a mile per minute.

Engines are being produced at 5000 per month now, and will reach over 8000 a year from now. Two years ago 400 per month was good production.

Many new engines are being worked on, Mr. Colwell said. Chrysler plans an inverted V-type 16-cyl liquid-cooled engine of 2000 hp, Ford is developing a V-12 liquid-cooled engine of about 2000 hp; using cast liners, crankshaft, camshaft; fuel injection and turbo. Lycoming has developed a flat, opposed engine, the design lending itself to wing installation.

Mr. Colwell also gave intimate information on strategic materials, rubber, fuel and oil, replacement materials, high altitude flying, new inventions and processes.

Praising the work of American engineers, he pointed out that the ingenuity of these men has produced the first practical sub-sonic bomber; the world's fastest pursuit ship and dive bomber; the world's most accurate bomb sight, the constant speed and variable-pitch propeller—all in a short time.

# SAE Coming Events

**Nov. 5 - 6**

**West Coast Regional Transportation & Maintenance Meeting**  
Fairmont Hotel - San Francisco, Calif.

**Nov. 13 - 14**

**National Transportation & Maintenance Meeting**  
Statler Hotel - Cleveland, Ohio

**Jan. 12 - 16, 1942**

**SAE Annual Meeting (and Engineering Display)**  
Book-Cadillac Hotel - Detroit, Mich.

**Baltimore - Nov. 6**

Engineers Club; dinner 6:30 p.m. Industrial Application of X-Ray - William H. Burroughs, Glenn L. Martin Co.

**Buffalo - Nov. 12**

**Chicago - No meeting**

**Cleveland - Nov. 13 & 14**

Statler Hotel. Participation in National Transportation & Maintenance Meeting.

**Detroit - Nov. 17**

Hotel Statler; dinner 6:30 p.m. Military Aviation Problems - Major B. S. Kelsey, Wright Field, Dayton, Ohio.

**Indiana - Nov. 6**

Antlers Hotel, Indianapolis; dinner 6:45 p.m. Plastics in National Defense - H. A. Frommelt, director of industrial research, Kearney & Trecker Corp.

**Metropolitan - Nov. 13**

Park Central Hotel; dinner 6:30 p.m. Future of the Automotive Diesel - B. B. Bachman, vice president, The Autocar Co.

**Milwaukee - Nov. 7**

Milwaukee Athletic Club; dinner 6:30 p.m. New Trends in Development and Design of Diesel Engines - C. G. A. Rosen, assistant chief engineer, Caterpillar Tractor Co.

**New England - Nov. 13**

Engineers Club, Boston, Mass.; dinner 6:30 p.m. Latest Trend in Passenger Cars - Prof. Dean A. Fales, Massachusetts Institute of Technology.

**Northern California - Nov. 5 & 6**

Fairmont Hotel, San Francisco. Participation in West Coast Transportation & Maintenance Meeting.

**Northwest - Nov. 12**

Hotel Edmond Meany, Seattle. Behind the Scenes in National Defense Engineering - A. T. Colwell, vice president, Thompson

Products, Inc., and president, SAE. Guest - John A. C. Warner, secretary and general manager, SAE.

**Oregon - Nov. 14**

Benson Hotel, Portland; dinner 6:45 p.m. Behind the Scenes in National Defense Engineering - A. T. Colwell, vice president, Thompson Products, Inc., and president, SAE. Guest - John A. C. Warner, secretary and general manager, SAE.

**Philadelphia - Nov. 12**

Engineers Club; dinner 6:30 p.m. Motor Oils for Heavy Duty Service - J. P. Stewart, head, automotive section, Socony-Vacuum Oil Co., Inc.

**Pittsburgh - Nov. 25**

Webster Hall; dinner 6:30 p.m. Meeting 8:30 p.m. Mellon Institute. Design Features and Performance Characteristics of the Mercedes-Benz DB-601A Aircraft Engine - Raymond W. Young, chief engineer, Wright Aeronautical Corp. (Engine on exhibition.)

**St. Louis - Nov. 25**

Candlelight House, Clayton, Mo.; dinner 6:30 p.m. Machining of Plastic Molds - H. A. Frommelt, director of industrial research, Kearney & Trecker Corp.

**Southern California - Nov. 14 & 28**

Nov. 14 - Elks Club, Los Angeles. Transportation & Maintenance meeting.

Nov. 28 - Hollywood Athletic Club, Los Angeles. Aircraft Engine meeting.

**Southern New England - Nov. 13**

Hotel Bond, Hartford, Conn.; dinner 6:30 p.m. Two Control Airplane - Otto C. Koppen, professor of aeronautical engineering, Massachusetts Institute of Technology.

**Syracuse - Nov. 24**

Onondaga Hotel; dinner 6:30 p.m. National Defense - The No. 1 Job - How It Has Affected Passenger Car Design - Joseph Geschelin, Detroit Technical Editor, Chilton Co.

**Tulsa Group - No meeting**



# About SAE Members

Among the executive personnel in the new Packard Aircraft Division are SAE members: **J. G. VINCENT**, vice president of engineering and in administrative charge; **W. R. GRISWOLD**, chief research engineer and member of the Executive Engineering Committee; **R. N. DuBOIS**, chief test engineer and member of the Executive Engineering Committee; **E. H. SMITH**, executive engineer and member of the Executive Engineering Committee, in charge of alterations, specifications, weights, and standards; **PAUL DUMAS**, service manager; **R. A. WEINHARDT**, chief draftsman; and **W. H. GRAVES**, chief metallurgist.

Appointment of **DR. ROBERT E. WILSON**, president, Pan American Petroleum & Transport Co., American Oil Co., N. Y., as

a member of the Industry Refining Committee for District 1 (Atlantic Coast), was recently announced by the Office of Petroleum Coordination, Washington. Until he resigned on August 1, Dr. Wilson served as petroleum consultant to OPM.

**DR. CHARLES E. LUCKE**, having reached the age of 65, has retired from the Columbia School of Engineering and becomes John Cox Stevens Professor-Emeritus of Mechanical Engineering. With this action he terminates 39 years of continuous service at the School of Engineering. Dr. Lucke holds the degrees of B.S., M.S., Ph.D., Sc.D., and the title of Commander, U. S. Navy; he is a Fellow of the ASME and a member of many other engineering societies. He is particularly identified with contribu-

tions in the internal-combustion engine, boiler, and heat transfer fields.

Appointment of **CHARLES H. DOLAN**, as general manager of the newly formed Aviation Division of Chicago Pneumatic Tool Co. was announced recently. Mr. Dolan, pilot in the World War Lafayette Escadrille and at one time vice president of Intercontinent Corp.—largest exporters of aircraft in the world—will be in charge of all aviation equipment production and development at the recently acquired plant at Garfield, N. J.

**L. R. MARCHANT** is now executive vice president, J. D. Street & Co., St. Louis. He was formerly manager, Illinois Farm Supply Co., Chicago.

**HARRY M. BRAMBERRY** who, up until July 1, was in charge of specifications and



Harry M. Bramberry

design, Perfect Circle Co., Hagerstown, Ind., now is employed by the Spring Division, Borg-Warner Corp., Bellwood, Ill. His new duties entail the supervision of a new development relevant to National Defense.

Five prominent SAE members were designated by President Roosevelt as members of the United States National Commission that will help prepare proposals for the permanent American Aeronautical Commission, created by the Inter-American Technical Aviation Conference at Lima, Peru, in 1937. The permanent commission will attempt to unify and codify international and national air laws of the American republics. SAE members are: **CAPT. HAROLD R. HARRIS**, vice president, Pan American Grace Airways, Inc., N. Y.; **PROF. JEROME C. HUNSAKER**, head of Mechanical Engineering Department, Massachusetts Institute of Technology, Cambridge; **COL. JOHN H. JOUETT**, president, Aeronautical Chamber of Commerce of America, Inc., Washington; **DR. GEORGE W. LEWIS**, director, aeronautical research, National Advisory Committee for Aeronautics, Washington; and **THEODORE P. WRIGHT**, assistant chief, aircraft branch, Office of Production Management.

**ALEX TAUB**, recently technical consultant in the Automotive Transportation and Agricultural Equipment Branch of OPM, has been designated a special consultant to Sidney Hillman, OPM co-director, to serve as liaison with Floyd Odum's Division of Contract Distribution on problems of conversion of manufacturing facilities to defense production. Since Mr. Hillman has taken on principal responsibility for placing defense employment in areas hit by curtailment, the attachment of Mr. Taub is intended to furnish expert advice on what can be produced with the equipment of affected plants, or what changes in tooling are feasible.

## Army Ordnance Group Honors Alden

**COL. HERBERT W. ALDEN** has been awarded the Frank A. Scott Gold Medal for Meritorious Service to National Defense.

Sponsored by the Army Ordnance Association in honor of the man who was the first chairman of the War Industries Board in 1917, this award to Col. Alden recognizes the leading part he has played in the design and production of military equipment.

Chairman of the SAE Ordnance Advisory Committee (which had its inception immediately following World War I) and President of the SAE in 1912 and 1923, Col. Alden's service to the U. S. Army began in 1917 when, as a major, he was assigned to engineering work on tanks, tractors, and trailers. He was sent to England to study tank warfare in its earliest applications to actual fighting and to help organize the Anglo-American Tank Commission, on which body he was American representative.

As the chief engineering executive of Timken-Detroit Axle Co., as well as in his capacity as the leader of SAE cooperation with the Ordnance Department, Col. Alden has continued to be a leading figure in technical progress throughout the ordnance field. His exceptional abilities are being applied effectively in the present emergency.

*Army Ordnance*, publication of the Army Ordnance Association, says of Col. Alden: "His service to industry and the Army ever has been distinguished by the absence of self-interest and the desire to give the best of his talents to the betterment of military equipment for the defense of his fellow citizens."

Presentation of this award to Col. Alden took place at the annual dinner



Col. Herbert W. Alden

of the Army Ordnance Association at the Book-Cadillac Hotel, Detroit, on Oct. 9.



L. C. Goad

L. C. GOAD was recently appointed assistant to Albert Bradley, vice president in charge of the car and truck group, General Motors Corp.

Two SAE members recently received Bendix-Westinghouse promotions. They will make their headquarters in the new company's general office at Elyria, O. C. A. OHL becomes assistant general manager, Bendix-Westinghouse Automotive Air Brake Co. This is a promotion from the position of director of sales and engineering, which he has held since 1933. Mr. Ohl was manager of the first service station of the present Bendix-Westinghouse Co. A. J. BENT, who has been in charge of the Cincinnati territory, becomes manufacturer's sales representative. Mr. Bent has been associated with the Bendix-Westinghouse Co. since 1935.

STANLEY D. LIVINGSTON was recently appointed manufacturing manager of the Eisemann Magneto Corp., N. Y. Formerly he was general sales manager of the Manufacturing Division. Mr. Livingston has been with the Eisemann Magneto Corp. since 1922, except for a period during which he was a consulting engineer, specializing in vibration engineering.

ETHAN A. BERRY has resigned as works manager, Wissahickon Tool Works, Inc., Bala-Cynwyd, Pa., to become assistant general manager, Chicago Pneumatic Tool Co., Garfield, N. J.

CHARLES HUDSON, formerly senior administrative assistant, Transportation Division, Tennessee Valley Authority, Knoxville, is now associate mechanical automotive engineer of the same division.

The Office of Production Management recently called RAY C. ELLIS, sales manager, Delco Radio Division, General Motors Corp., Kokomo, Ind., to Washington to participate in radio production analysis work.

RICHARD H. DEPEW, JR., is the new executive vice president of Taylorcraft Aviation Corp., Alliance, O. He will continue his duties as treasurer and general manager of the company.

GEORGE H. STOUGHTON recently was transferred from General Motors Institute, Flint, Mich., where he was an instructor, to the General Motors Diesel Division, Detroit, where he will be employed as a dynamometer test engineer. As a consequence of this change, Mr. Stoughton will no longer

act as faculty adviser of the SAE Student Branch at General Motors Institute.

MR. & MRS. EDWIN H. EHRLMAN celebrated their Golden Wedding anniversary, Oct. 14. Mr. Ehrman has been chairman, Screw Threads Division of the SAE Standards Committee for many years and represented the SAE on the International Committee of Standards during the last World War. He was a representative on the National Screw Thread Commission and now is one of the SAE representatives on the Sectional Committee B1 on Screw Threads under ASA procedure. Mr. Ehrman is chief engineer, Standard Screw Co., Chicago.

FREDERICK W. ROHDE now holds the post of associate aircraft inspector for the Flight Test Engineering and Factory Inspection Section, Civil Aeronautics Administration. He is located at La Guardia Airport, Jackson Heights, N. Y. Formerly he was procurement inspector, Aircraft Engines, U. S. Army Air Corps, Materiel Division, Wright Field, Dayton, O.

JOSEPH A. ANGLADA recently joined the Briggs Mfg. Co., Detroit. Prior to this affiliation he was a consulting engineer in New York.



Joseph A. Anglada

H. T. WOOLSON, Chrysler Corp. executive engineer, represented the SAE at the colorful 175th Anniversary Convocation of Rutgers University, New Brunswick, N. J., Oct. 9-11. The celebration was attended by delegates from more than three hundred universities, colleges, societies, and research foundations. He is a former SAE president.

JOHN W. ROGERS has taken a position as chief engineer with Continental Trailer & Equipment Co., Honolulu. He severs connections with Fruehauf Trailer Co. of Calif., Los Angeles, where he was an engineer.

WALTER J. CRANE has been promoted from junior engineer to garage foreman, Pacific Highway Transport, Seattle, Wash. Mr. Crane is treasurer of the SAE Northwest Section this year.

C. S. McCANN has left Delco Products Division, General Motors Corp., Dayton, O., where he was a shock absorber engineer, to work in the Aviation Engine Plant, Buick Motor Division, General Motors Corp., Melrose Park, Ill. He will be an assistant engine test supervisor.

PAUL E. BOOTH is now active as part owner, Oatis-Booth Machinery Co., Indianapolis, machine tool dealers. He was formerly vice president, Republic Machinery Co., Indianapolis.

C. M. LARSON, chief consulting engineer, Sinclair Refining Co., N. Y., has been named expert consultant to the Secretary of War.

Formerly assistant chief engineer, Marlin-Rockwell Corp., Jamestown, N. Y., THOMAS BARISH is now manager, Propeller Division,

#### Made Manager



Thomas Barish

Engineering and Research Corp., Riverdale, Md. He will continue as consulting engineer with M-R Corp.

JOSEPH GESCHELIN, Detroit editor, Chilton Publications, is on call as automotive consultant to the Division of Civilian Supply of OPM.

FREDERICK J. GRIFFITHS, formerly executive vice president, Copperweld Steel Co., Warren, O., recently became a steel consultant with offices at Massillon, O. He is also a representative for Chromium Mining & Smelting Corp., Ltd., Hamilton, Can.

DAVID L. SCHMIDT has resigned as test engineer, Briggs Mfg. Co., Detroit, to become a pilot with Eastern Air Lines, Inc., Newark.

JOHN A. BINDER, formerly with Midland Steel Products Co., Cleveland, has resigned to accept a position in the Aviation Division, Studebaker Corp., South Bend.

Former Tri-State College of Engineering student DONALD OSBORN, has joined Bendix Products, Division Bendix Aviation Corp., South Bend, as draftsman, Aircraft Carburetor Department. The company makes carburetors, brakes, vacuum controls, gun turrets, and similar items.

MICHAEL W. LARINOFF, former Illinois Institute of Technology student, is now a design engineer with J. I. Case Co., Rock Island, Ill.

WALTER R. BREELER, associate director of research, Allegheny Ludlum Steel Corp., Pittsburgh, talked on "Molybdenum High-Speed Steels" before the Tri-State chapter of the American Society of Tool Engineers, at Springfield, Vt., Oct. 8.

#### Gave Steel Talk



Walter R. Bresler

**J. P. MILLER** was recently transferred from the Research Division, General Motors Corp., where he was chief draftsman, Diesel Design Department, to Electro-Motive Corp., a G.M. subsidiary, in the capacity of engineer, Special Engines Division.

**EDWIN KATZ** is now in the employment of Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn. He was formerly a student of the University of Wisconsin.

Cooper Union graduate **LEON J. BALK** is at present employed as an engineer by the U. S. Army Air Corps at the Ford Motor Co., Dearborn, Mich., testing aviation engines.

**A. GEORGE W. BROWN**, formerly equipment engineer, Jamaica Buses, Inc., Jamaica, L. I., has been named transportation engineer, Schenley Distilleries, Inc., Cincinnati.

**M. D. MURRAY**, formerly experimental engine tester, Wright Aeronautical Corp., Paterson, N. J., is now employed as a field service engineer.

\*\*\*\*\*  
**In Military Services**

**JOHN HARRISON, JR.**, former president, Charles F. Kellom & Co., Inc., was ordered

into active duty as Lieutenant-Commander in the U. S. Naval Reserve.

**LT.-COM. JAMES B. TAYLOR, JR.**, is on active duty at the U. S. Naval Air Station, Floyd Bennett Field, Brooklyn, N. Y. Prior to this assignment, Lt. Taylor was associated with the Bureau of Aeronautics, Navy Department, Washington, D. C.

**LT.-COL. ARTHUR B. DOMONOSKE**, Ordnance Reserve, recently returned to Stanford University after an extended tour of duty in the U. S. Army Ordnance Department, office of assistant to chief of Industrial Service, Engineering and Research.

**LT.-COL. M. B. CHITTICK**, formerly manager, Specialty and Tech. Sales, Pure Oil Co., Chicago, and now with the Army's Chemical Warfare Service, has been named a member of the War Department's liquid fuel and lubricants committee, which determines specifications for petroleum products used by the Army. **-CAPT. GEORGE H. SCHOENBAUM**, formerly of Standard Oil Co. of N. J., has been named executive secretary of this committee.

**LT.-COL. B. W. KUNZ** has been transferred from the U. S. Army, Quartermaster Corps, Fort Bragg, N. C., to the Office of Quartermaster General, Washington, D. C.

**GEORGE G. LAMB**, former group leader, Research Department at Whiting, Standard Oil Co. of Ind., is now a Lieutenant, Bureau of Aeronautics, Navy Department, Washington, D. C.

**LT. D. W. SMITH, JR.**, has left Evans Products Co., Detroit, where he was sales engineer, and is now stationed with the 182nd Field Artillery, Fort Leonard Wood, Missouri.

**LT. HORACE W. RISTEEN**, U. S. Navy, is now connected with the Bureau of Yards and Docks, Washington, D. C. Formerly he was in the Department of Marine Engineering, U. S. Naval Academy, Annapolis.

**C. O. FRENCH, JR.**, is with the U. S. Army Air Corps, Wright Field, Dayton, O. He is a Lieutenant, equipment laboratory, experimental engineering section. Prior to being called into active military service, Lt. French was district automotive engineer, Socony-Vacuum Oil Co., Inc., McKees Rocks, Pa.

**CHARLES S. TRACY**, formerly research engineer, Standard Oil Development Co., Elizabeth, N. J., is a 1st Lieutenant, U. S. Marine Corps, Division Headquarters Company, First Marine Division, FMF, Marine Barracks, Quantico, Va.

**1st LT. DONALD L. BOWER**, U. S. Army Air Corps, (October, 1941, SAE Journal—"Meet the Services") gives his full present assignment as that of technical assistant to the Production Engineering Officer, Central Procurement District, Materiel Division, Detroit.

**WILLIAM E. WAGAR**, Purdue University graduate, is on duty with U. S. Army as a 2nd Lieutenant, Field Artillery. He attended the Field Artillery School of Fire, Fort Sill, Okla., until Oct. 13.

**JOSEPH W. ALLEN** has been called to duty in the Bureau of Aeronautics, Navy Department, Washington, D. C. He leaves the Eclipse Aviation Division, Bendix Aviation Corp., Bendix, N. J., where he was chief electrical engineer.

# GUARANTEED FORGINGS



**STANDARD for AIRCRAFT**

**WYMAN • GORDON**  
**WORCESTER, MASSACHUSETTS**  
**HARVEY, ILLINOIS - DETROIT, MICHIGAN**



# NEW MEMBERS Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between Sept. 15, 1941, and Oct. 15, 1941.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

## Baltimore Section

Chappell, Paul F. (A) manager, industrial service department, American Oil Co., American Oil Bldg., Baltimore (mail) 5506 S. Bend Rd.

Montgomery, Charles D., 2nd Lt. (J) proof officer, automotive test, research division, engines and power trains group, U. S. Army, Ordnance Dept., Aberdeen Proving Ground, Md.

Nowell, Donald L. (S M) junior mechanical engineer, U. S. Naval Engineering Experiment Station, Annapolis, Md. (mail) 225 Severn Ave., Eastport, Md.

Spinner, Robert William, 2nd Lt. (J) test engineer, U. S. Army, Main Post, Aberdeen Proving Ground, Md.

Staiger, Lea R., 1st Lt. (S M) U. S. Army, Quartermaster Motor Transport School, Holabird Quartermaster Depot, Baltimore.

## Buffalo Section

Stupar, Max (M) co-ordinator of manufacturing, Bell Aircraft Corp., 2050 Elmwood Ave., Buffalo (mail) Harris Hill Rd., Route 2, Williamsville, N. Y.

## Canadian Section

Allcock, Frederick (M) vice president, charge of manufacturing, Thompson Products, Ltd., Box 217, St. Catharines, Ontario.

Guy, Ross T. (J) engineering draftsman, General Motors of Canada, Ltd., Oshawa, Ontario (mail) 141 Agnes St.

Paupst, M. P. (A) domestic service promotion, Ford Motor Co. of Canada, Ltd., Windsor, Ontario (mail) 1377 Dougall Ave.

Wier, John E. (A) service manager, Mack Trucks of Canada, Ltd., 255 Dufferin St., Toronto, Ontario (mail) 72 Don Valley Dr.

## Chicago Section

Arducci, Wallace F. (M) director of research, Foote Bros. Gear & Machine Corp., 5301 S. Western Blvd., Chicago.

Boldt, Kenneth (J) test engineer, Pure Oil Co., Box 266, Winnetka, Ill.

Hungerford, Norman C. (A) radio department foreman, United Air Lines Transport Corp., Chicago (mail) 725 N. Brainard Ave., La Grange, Ill.

## Cleveland Section

Brown, Robert Vaughan (M) assistant professor, Case School of Applied Science, 10900 Euclid Ave., Cleveland.

Davidson, Charles L. (A) assistant sales manager, Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland.

Gray, Robert (J) assistant engineer, Leece-Neville Co., 5363 Hamilton Ave., Cleveland.

Leska, Carl J. (J) engineer, Thompson Products, Inc., 6007 Cedar Ave., Cleveland (mail) 1202 E. 172nd St.

Smetzer, John D. (A) superintendent, Weatherhead Co., 300 E. 131st St., Cleveland.

Syvetsen, Edwin T. (A) general sales

manager, service division, Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland.

## Detroit Section

Ahlers, Walter C. (M) assistant district manager, S K F Industries, Inc., 2820 E.

Grand Blvd., Detroit (mail) 27775 Lathrup Blvd., Birmingham, Mich.

Black, Carl B. (M) vice president, Standard Steel Spring Co., Coraopolis, Pa. (mail) 5-233 General Motors Bldg., Detroit.

Butterfield, J. P. (J) engineer, Chrysler Corp., Highland Park, Mich (mail) 8100 E. Jefferson, Detroit.

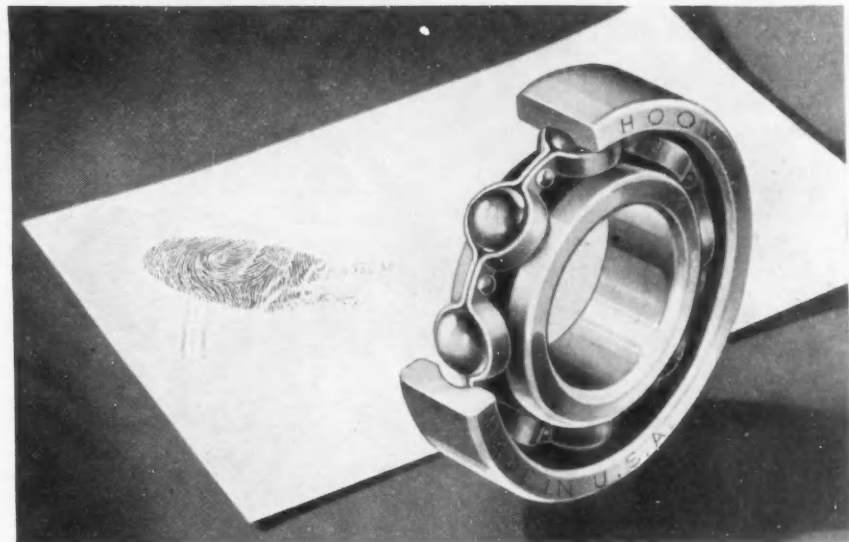
Crowe, William L. (A) service representative, Detroit Diesel Engine Division, General Motors Corp., Detroit (mail) 105 Melrose Ave., Toledo, Ohio.

Haiken, John (A) director, defense training, Chrysler Corp., Detroit (mail) 2040 Geddes Ave., Ann Arbor, Mich.

Klein, Benjamin J. (M) chief inspector, C. M. Smilie & Co., 520 E. Larned, Detroit (mail) 7800 Burnett Ave.

Martz, Lawrence S. (M) research department, Micromatic Hone Corp., 1345 E. Milwaukee Ave., Detroit.

# Exclusive Identification

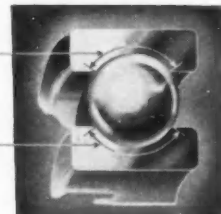


Hoover Ball Bearings are the only ball bearings with HONED RACEWAYS. Honed by a new patented process behind closed doors, Hoover raceways acquire a mechanical beauty and mirror-like smoothness previously possessed only by costly laboratory samples. And so efficient is this new method of honing that this construction is available at a cost which permits its use on commercial products of quality.

Only the name "Hoover" on a ball bearing identifies it as a HONED RACEWAY BEARING. Look for the mark of HONED quality.

Honed Raceways maintain the maximum area of contact in support of the load.

Honed Raceways (without demanding an excessive premium) provide greater capacity and longer life. They have introduced a new and higher standard of quietness and smoothness.



HONED RACEWAYS... AN EXCLUSIVE HOOVER FEATURE

**HOOVER** *The Aristocrat of Bearings*

HOOVER BALL AND BEARING COMPANY, ANN ARBOR, MICHIGAN

Rightmyer, Holden W. (A) chief engineer, American Swiss Co., 1650 Fernwood Ave., Toledo, Ohio.

Rosborough, William McLure (M) sales engineer, 704 Stephenson Bldg., Detroit.

Swart, Clayton (M) engineer in charge, National Stamping Co., 630 St. Jean Ave., Detroit.

Wayman, Robert Wm. (J) engineering department, Detroit Transmission Division, General Motors Corp., 5200 Riopelle St., Detroit (mail) 3016 E. Grand Blvd.

Wiseman, William A. (M) assistant chief engineer, Warner Aircraft Corp., 20263 Hoover, Detroit (mail) 12723 Greenlawn.

#### Indiana Section

Heath, Robert A. (J) development engineer, International Harvester Co., Fort Wayne, Ind. (mail) 2721 N. Anthony.

Kacuper, Eugene C. (J) detail draftsman, Allison Division, General Motors Corp., Indianapolis (mail) 607 N. Bancroft.

Lee, James D. (J) superintendent, Ideal Engineering, Inc., 420 W. South St., Indianapolis.

Lewis, Vernon H. (J) design engineer, J. D. Adams Mfg. Co., 217 S. Belmont Ave., Indianapolis (mail) 1830 Greenbush St., Lafayette, Ind.

#### Metropolitan Section

Barcelona, Anthony Richard (A) heat treater, Air Associates, Inc., Bendix, N. J. (mail) 401 North Ave., Wood Ridge, N. J.

Burrell, George (M) chief test pilot, Republic Aircraft Corp., Farmingdale, L. I., N. Y. (mail) Fairfields, Huntington Station, L. I., N. Y.

Cram, Harkness Warren (A) sales manager, Aircraft Screw Products Co., Inc., 47-23 35th St., Long Island City, N. Y. (mail) 100 Douglas Place, Mt. Vernon, N. Y.

Hoyt, W. Bradford (J) materials engineering, M. W. Kellogg Co., 225 Broadway, New York City.

Keif, Aubrey (A) manager, aviation sales, The Texas Co., 135 E. 42nd St., New York City.

Kretschmer, Louis (A) secretary, treasurer, K & G Auto Parts, Inc., 397 Empire Blvd., Brooklyn, N. Y.; president, Houpert Machine Division, Inc., 600 Bushwick Ave., Brooklyn, N. Y. (mail) 118-11 84th Ave., Kew Gardens, L. I., N. Y.

Moore, Hollister (A) manager, membership department, Society of Automotive Engineers, Inc., 29 W. 39th St., New York City (mail) 351 Morris Ave., Mountain Lakes, N. J.

Polkoph, Robert C. (J) test engineer, Wright Aeronautical Corp., Paterson, N. J. (mail) 666 W. 162nd St., New York City.

Rice, William James (A) working foreman, Sol. Schildkraut, Inc., Liberty Ave. & Merrick Rd., Jamaica, L. I., N. Y. (mail) 134-29 175th St., Springfield, L. I., N. Y.

Sargent, Robert S. (J) transportation consultant, Ebasco Services, Inc., 2 Rector St., New York City.

Speas, R. Dixon (J) assistant to chief engineering pilot, American Airlines, Inc., Engineering Department, N. Y. Municipal Airport, Jackson Heights, L. I., N. Y.

#### Milwaukee Section

Bauer, Earl Becker (A) educational director, Wisconsin Magneto Co., 918 N. Broadway, Milwaukee.

#### New England Section

Holmquist, Richard (J) motor analysis, tester, Cadillac Automobile Co. of Boston, Boston (mail) Plain St., Walpole, Mass.

McDonald, Thomas F. (A) automotive engineer, Socony-Vacuum Oil Co., Inc., 3360 Pawtucket Ave., East Providence, R. I. (mail) 647 Birch St., Fall River, Mass.

Pepin, A. J. (M) chief metallurgist, Wyman-Gordon Co., Worcester, Mass.

#### Northern California Section

Muldoon, Matt E. (A) district manager, Signal Oil Co., 811 W. Seventh St., Los Angeles (mail) 633 36th St., Sacramento, Calif.

Salzman, Phil C. (S M) air safety investigator, Civil Aeronautics Board, Safety Bureau, Commerce Bldg., Washington (mail) 560 Blossom Way, San Leandro, Calif.

#### Northwest Section

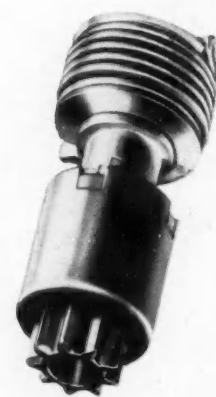
Finney, O. T. (A) sales engineer, Standard Oil Co. of California, Aberdeen, Wash.

#### Philadelphia Section

Kroening, Karl R. (J) superintendent of equipment, Schuylkill Valley Lines, Inc., 1000 E. Main St., Norristown, Pa. (mail) 31 Wilson Rd., King of Prussia, Pa.

Faithfully yours . . . and  
your customers'

**Bendix  
Drive**



First contact your customers have with your cars and trucks is at the moment they touch the starter button. Much of what they think of your product through its lifetime depends upon the efficiency and reliability of starting.

Isn't it well worth while to make each one of those thousands of starts fortify owner satisfaction? You are sure of doing just that when you provide the Bendix Drive. For the Bendix Drive, backed by hundreds of billions of effortless starts, makes starting simple, foolproof and automatic.

There's a Bendix Drive especially engineered for every type of starter control — foot button, clutch or accelerator pedal, dash button or with Startix, completely automatic switch key starting. Specify the Bendix Drive and increase owner satisfaction.

**ECLIPSE MACHINE DIVISION**  
BENDIX AVIATION CORPORATION  
ELMIRA, NEW YORK

*"The mechanical hand  
that cranks your car"*

#### St. Louis Section

Brehm, Donald R. (A) district manager, Bendix-Westinghouse Automotive Air Brake Co., Elyria, Ohio (mail) 718 Central Terminal Bldg., St. Louis, Mo.

Smith, Arnold H. (M) assistant sales manager, Monsanto Chemical Co., 1700 S. Second St., St. Louis, Mo.

Stoehr, Alfred Franz (J) industrial representative, Sinclair Refining Co, 1301 Gratiot St., St. Louis, Mo. (mail) 6236 Arendes Dr.

#### Southern California Section

Bunch, Charles B. (A) service representative, B G Corp., 136 W. 52nd St., New York City (mail) c/o Pacific Airmotive Corp., Lockheed Air Terminal, Burbank, Calif.

McClarren, Don (A) night assistant, charge of material and release group, engineering department, Consolidated Aircraft Corp., Lindbergh Field, San Diego, Calif. (mail) 3537 Kettner Blvd.

Prussel, Otis G. (A) salesman, industrial division, Pennzoil Co., 942 S. Hope St., Los Angeles.

Wells, Thomas M. (M) senior tool planner, Vega Airplane Co., Burbank, Calif. (mail) 1418 Alpha Ave., Pasadena, Calif.

#### Southern New England Section

Cooper, Kenneth Clark (J) research engineer, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn. (mail) 159 Adams St., Buckland, Conn.

Green, Arthur W. F. (M) materials engineer, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn. (mail) 38 Woodpond Rd., West Hartford, Conn.

Leas, Lawrence (J) engine test inspector, Pratt & Whitney Aircraft Division, United Aircraft Corp., East Hartford, Conn. (mail) 98 Connecticut Blvd.

#### Tulsa Group

Buchanan, Norman (A) service engineer, A. C. F. Motors Co., 423 S. Field St., Dallas, Tex.

Chombart, Louis Gerard (J) research and development engineer, Schlumberger Well Surveying Corp., P. O. Box 2175, Houston, Tex.

#### Washington Section

Cleveland, Allen E., 1st Lt. (J) electrical, mechanical, research and development engineer, U. S. Army, Quartermaster Corps, Motor Transport Division, Office of Quartermaster General, 4126 New Municipal Center Bldg., Fourth & Indiana Ave., N.W., Washington.

Huester, Harry J., Lt.-Com. USNR (M) technical adviser, Reynolds Metals Co., 201 Southern Bldg., Washington.

Meeks, Fearson S. (M) owner, S. J. Meeks' Son, 622 G St., N.W., Washington.

Moore, Charles S. (S M) mechanical engineer, National Advisory Committee for Aeronautics, Langley Field, Hampton, Va. (mail) 319 Columbia Ave.

#### Outside of Section Territory

Baird, A. Lincoln, Lt. (S M) process superintendent, U. S. Navy, Assembly & Repair Dept., Naval Air Station, Pensacola, Fla.

Dunham, Elmer J. (M) chief engineer, Clark Tractor Division, Clark Equipment Co., Battle Creek, Mich.

Jacobson, Alonzo E. (A) president, H. K. Stahl Co., 2314 Wycliffe St., St. Paul, Minn.

Lundblad, Curtis Eugene (J) civilian instructor, aircraft engines, U. S. Army, Air Corps Technical School, Chanute Field, Ill. (mail) 208 E. Grove Ave., Rantoul, Ill.

McInerney, James Martin (J) production manager, McInerney Spring & Wire Co., 655 Godfrey Ave., S.W., Grand Rapids, Mich.

Moreau, Henry Adolphe (M) superintendent, operations, National Airlines, Inc., Jacksonville Airport, Jacksonville, Fla.

Sanderson, Frank D., Master Sergeant (S M) shop foreman, U. S. Army, Company "A," 86th Quartermaster Battalion (LM), Fort McPherson, Ga.

Stevenson, Ross J. (S M) instructor U. S. Army, Air Corps Technical School, Chanute Field, Ill. (mail) 703 W. Church St., Urbana, Ill.

#### Foreign

Barker, Henry Thomas (F M) technical manager, Borg & Beck Co., Ltd., Tachbrook Rd., Leamington Spa, Warwicks, England (mail) 17 Highland Rd., Lillington.

Jackson, Robert R. (F M) research department, engine development, Bristol Aeroplane Co., Filton, Bristol, England (mail) 8 Hyland Grove, Henbury, Bristol, England.



## Dynamic Detroit

ALWAYS a city of action, Detroit today is busier than ever . . . going all out to help make America the arsenal of defense! From all over the globe thousands pour in as other thousands depart by train, plane and motor!

In spite of this stepped-up activity, the Book-Cadillac Hotel continues as always to extend the warm hospitality with which SAE members are familiar. So count on us as usual for a spacious, comfortably appointed room ready and awaiting your arrival. You'll find everything . . . food, service and entertainment . . . typical of the standards that have made the "Book" one of America's great hotels.

## BOOK-CADILLAC HOTEL

1200 Rooms • Minimum Rate \$3.30

Washington Blvd. at Michigan Avenue, Detroit

W. O. SEELBACH  
Managing Director



W. J. CHITTENDEN, Jr.  
Resident Manager



# APPLICATIONS Received

The applications for membership received between Sept. 15, 1941, and Oct. 15, 1941, are listed below. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

## Baltimore Section

Daniels, Russell, shop superintendent, W. T. Cowan, Inc., Baltimore.

O'Connor, Pat, senior instructor, War Department, Motor Transport School, Camp Holabird, Md.

## Canadian Section

Abbott, Robert, vice president, general manager, Canadian Raybestos Co., Ltd., Peterborough, Ont., Canada.

Carter, William Edward, clerk, Bennet & Elliott Ltd., Toronto, Ont., Canada.



## IN WAR...AS IN PEACE Arkwright stands for quality!

Whether American industry is producing the weapons of war or the tools of peace, Arkwright stands ever ready to meet industry's needs with the same high quality tracing cloth!

Years of testing in Arkwright laboratories . . . years of insistence on highest quality materials and highest standards of manufacturing

have prepared Arkwright for the present emergency. Today, you can order Arkwright tracing cloths with the same confidence in quality . . . the same assurance of rapid delivery that has given Arkwright its recognized position as the leading American producer of tracing cloth for over twenty years! Arkwright Finishing Co., Providence, R. I.

*Arkwright* TRACING CLOTHS



Green, R. E. Stewart, Ontario sales representative, Collins & Aikman of Canada, Ltd., Toronto, Ont., Canada.

Paquette, Norman O., technical assistant to director of production, Department of Munitions & Supply, Automotive Branch, Canadian Government, Ottawa, Ont., Canada.

## Chicago Section

du Pont, Eugene, III, special representative, fleet sales, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. Mail: Lake Forest, Ill.

Herron, John R., cost reduction engineer, Ingersoll Steel & Disc Division, Borg-Warner Corp., Chicago.

Mashinter, William H., research engineer, Standard Oil Co. (Ind.) Whiting, Ind.

McLaurin, W. M., chief engineer, Guiberson Diesel Engine Co., Chicago.

## Cleveland Section

Bredenbeck, Bill, experimental work, Thompson Products, Inc., Cleveland.

Doelcher, Harold S., test engineer, Pump Engineering Service Corp., Cleveland.

Holt, Ray G., test engineer, Pump Engineering Service Corp., Cleveland.

Kraus, John Walter, industrial engineer, Thompson Products, Inc., Cleveland.

Luli, Walter L., engineer, Twin Coach Co., Kent, O.

Nason, Alfred G., salesman, Thompson Products, Inc., Cleveland.

## Dayton Section

Calhoun, William K., chief clerk, Wright Aeronautical Corp., Lockland, O.

## Detroit Section

Abbott, Joseph A., technical clerk, Cadillac Motor Car Division, General Motors Corp., Detroit.

Adams, Daniel M., automotive sheet metal design, Cadillac Motor Car Division, General Motors Corp., Detroit.

Amundsen, Ernest G., test engineer, U. S. Army, Air Corps, Continental Motors Corp., Detroit.

Bailey, Harold W., assistant field engineer, U. S. Rubber Co., Detroit.

Bevan, Lloyd D., research engineer, Continental Aviation & Engineering Corp., Detroit.

Burnett, William Edward, engineer, car research, Cadillac Motor Car Division, General Motors Corp., Detroit.

Carlson, Ralph E., draftsman, Detroit Diesel Engine Division, General Motors Corp., Detroit.

Champion, James E., engine procurement inspector, Materiel Division, U. S. Army, Air Corps, Wright Field, Dayton, O. Mail: Continental Motors Corp., Detroit.

Cook, Norman E., Monroe Auto Equipment Co., Monroe, Mich.

Cowin, Fred H., laboratory technician, Cadillac Motor Car Division, General Motors Corp., Detroit.

Dunlavy, Robert J., electrical engineer, Chrysler Corp., Highland Park, Mich.

DuBois, Ralph Hector, Bower Roller Bearing Co., Detroit.

Emerson, Francis Horton, assistant professor, College of Engineering, Wayne University, Detroit.

Everett, Milton C., chief draftsman, Briggs Mfg. Co., Detroit.

Fishtahler, Vernon F., testing engineer, Cadillac Motor Car Division, General Motors Corp., Detroit.

Frantz, Ralph S., assistant chief body engineer in charge of sheet metal, Cadillac Motor Car Division, General Motors Corp., Detroit.

Garwood, Maurice F., metallurgist, Chrysler Corp., Highland Park, Mich.

Giannini, Peter E., junior mechanical engineer, Materiel Division, U. S. Army, Air Corps, Detroit.

Grimm, Leonard J., chief inspector, War Department, U. S. Army, Quartermaster Corps, Lansing, Mich.

Haddad, Joseph, engineer, model test unit, Materiel Division, Air Corps, Wright Field, Dayton, O. Mail: 10401 E. Jefferson Ave., Detroit.

Hamada, Edward S., designer, Chevrolet Motor Division, General Motors Corp., Detroit.

Isley, Walter F., aircraft engine development, Briggs Mfg. Co., Detroit.

Jahncke, Donald Edward, apprentice tool engineer, Plymouth Division, Chrysler Corp., Detroit.

Karpus, John Thomas, Jr., junior engineer, Holley Carburetor Co., Detroit.

Kivell, William J., laboratory technician, Chrysler Corp., Detroit.

Moyer, Elton S., foreman, Cadillac Motor Car Division, General Motors Corp., Detroit.

Owen, Webster J., assistant accessory engineer, Cadillac Motor Car Division, General Motors Corp., Detroit.

Petrie, Marcel W., production research chief, Chrysler Corp., Detroit.

Rasmussen, Carlton Albert, laboratory technician, Cadillac Motor Car Division, General Motors Corp., Detroit.

Read, Charles Ernest, assistant chief engineer, Monroe Auto Equipment Co., Monroe, Mich.

St. Germain, William Albert, junior mechanical engineer, U. S. Army, Air Corps, Detroit.

Searle, Dana A., gear specialist, Briggs Mfg. Co., Detroit.

Saltzman, Ernest Clifford, Jr., engineer, model test unit, Materiel Division, Air Corps, Wright Field, Dayton, Ohio. Mail: 1355 Nottingham, Grosse Pointe, Mich.

Shabluk, Henry, draftsman, Continental Aviation & Engineering Corp., Detroit.

Shaeffer, George D., chief engineer, road machinery division, Gar Wood Industries, Inc., Detroit.

Sketch, William B., project engineer, Continental Aviation & Engineering Corp., Detroit.

Smith, Matthew, chief inspector, Chrysler Corp., Detroit.

Snyder, William Walter, Jr., test engineer, Continental Aviation & Engineering Corp., Detroit.

Stinson, Lawrence E., research engineer, Ethyl Gasoline Corp., Detroit.

Streicher, George M., general superintendent, Monroe Auto Equipment Co., Monroe, Mich.

Swift, Clarence B., owner, Swift Mfg. Co., and secretary, treasurer, Ultra Lap Machine Co., Detroit.

Vaughn, Robert M., quality inspector, Chevrolet Motor Division, General Motors Corp., Detroit.

Walker, Norman, president, Ultra Lap Machine Co., Detroit.

Watson, William W., dynamometer testing, Chevrolet Motor Division, General Motors Corp., Flint, Mich.

Wheaton, Clark E., metallurgist, Continental Motors Corp., Detroit.

White, Brandon C., vice president in charge of engineering, Ultra Lap Machine Co., Detroit.

Wright, Robert Ernest, mechanical engineer, Monsanto Chemical Co., Trenton, Mich.

Wyatt, Raymond A., design engineer, Briggs Mfg. Co., Detroit.

#### Indiana Section

McCaul, Gerald Joseph, test engineer, Allison Division, General Motors Corp., Indianapolis.

Rose, Mauri, installation engineer, Allison Division, General Motors Corp., Indianapolis.

Springer, Robert Hughes, installation en-

gineer, Allison Division, General Motors Corp., Indianapolis.

#### Metropolitan Section

Bates, D. Barker, 22 E. 38th St., New York City.

Blair, Richard W., engineer, Wright Aeronautical Corp., Paterson, N. J.

Bosco, George B., Jr., engineer, service department, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

Brookbanks, Ernest A., senior examiner, British Air Commission, Washington, D. C. Mail: 679 E. 23rd St., Paterson, N. J.

Clurman, Stanley P., junior engineer, Curtiss Propeller Division, Curtiss-Wright Corp., Caldwell, N. J.

Crofton, William M., sales engineer, Induction Heating Corp., New York City.

De Matteo, Adolphe John, engineering draftsman, International-Plainfield Motor Co., Plainfield, N. J.

English, William Paul, engineering records supervisor, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

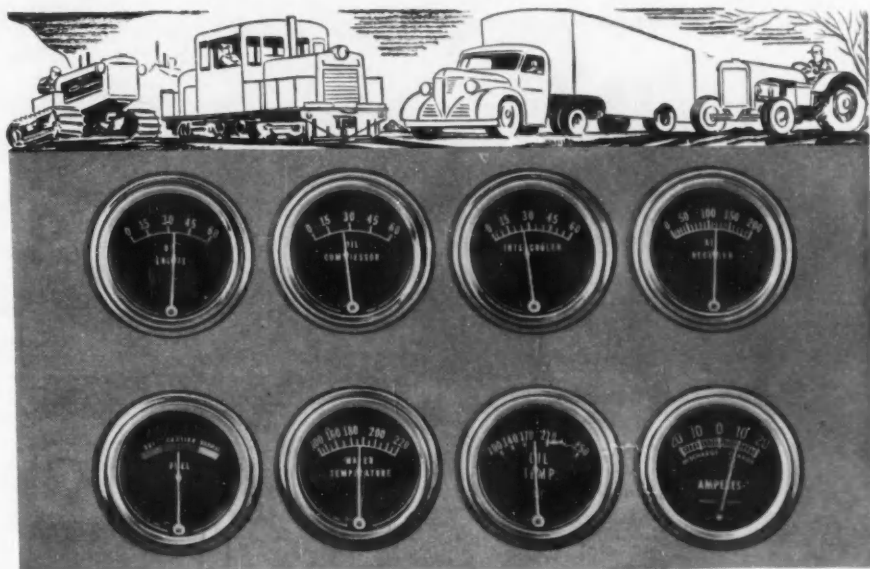
Evans, Palmer Davis, test engineer, Wright Aeronautical Corp., Paterson, N. J.

Fuller, Fernly Leroy, junior project engineer, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

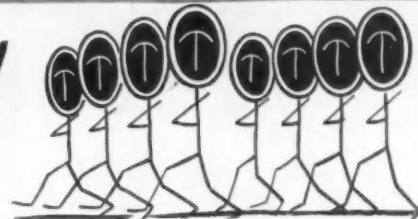
Galvanoni, Aldo Benjamin, test engineer, Wright Aeronautical Corp., Paterson, N. J.

Harris, Morton Foster, junior engineer, Wright Aeronautical Corp., Paterson, N. J.

Hegner, Alfred, experimental planning, Ranger Aircraft Engines, Division Fairchild



# EYES RIGHT!



RIGHT! . . . eyes are focused on this squad of Rochester Instruments . . . each specifically designed and built for heavy-duty service on either gasoline or diesel powered Trucks, Tractors, and any type of unsprung equipment where instruments of this type must be able to withstand excessive vibration, high over-load pressures, etc. In short, they must be able to absorb any kind of punishment and still maintain the same high degree of accuracy, dependability and operating efficiency. Rochester Instruments do just that! That's why they are being used exclusively by America's leading Tractor Manufacturers.

Write Today for specifications, prices and samples of these dependable, low-cost, easy-to-install instruments. There is a type to meet every requirement.

ROCHESTER MFG. CO. INC., 21 ROCKWOOD ST., ROCHESTER, N. Y.

PRESSURE GAUGES for indicating Oil, Air and Fuel pressures. TEMPERATURE GAUGES for indicating Oil and Water temperatures. AMMETERS for use on all types of Heavy-Duty Equipment.

## ROCHESTER *Individually Calibrated* INSTRUMENTS

FOR ACCURATE LIQUID LEVEL, PRESSURE AND TEMPERATURE INDICATION

Engine & Airplane Corp., Farmingdale, L. I., N. Y.

**Heidner, Richard C.**, mechanical engineer, Socony-Vacuum Oil Co., Inc., Brooklyn, N. Y.

**Hoffmann, Karl**, draftsman, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

**Jennings, Frederick Beach**, physical stress laboratory, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

**Lane, George W.**, junior test engineer, Wright Aeronautical Corp., Paterson, N. J.

**Loscy, A. Marquis**, checker, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

**Melville, James R. A.**, experimental tester, International-Plainfield Motor Co., Plainfield, N. J.

**Minton, R. Elmer**, sales manager, Curtiss

Propeller Division, Curtiss-Wright Corp., Caldwell, N. J.

**Moore, Horace T.**, armament engineer, Brewster Aeronautical Corp., Long Island City, N. Y.

**Muldore, Joseph A.**, chief inspector, B. H. Aircraft Co., Long Island City, N. Y.

**Newbold, F. Eugene, Jr.**, equipment engineer, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

**Peters, Fred A.**, leadman, carburetor test laboratory, Wright Aeronautical Corp., Paterson, N. J.

**Pike, Kenneth R.**, junior test engineer, Wright Aeronautical Corp., Paterson, N. J.

**Planiol, Andre**, research engineer, Ranger Aircraft Engines, Division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y.

**Price, John Francis**, assistant supervisor of installation drawings, Wright Aeronautical Corp., Paterson, N. J.

**Scanlan, Jack A., Jr.**, junior experimental test engineer, Wright Aeronautical Corp., Paterson, N. J.

**Smith, Hugh L.**, operations manager, American Airlines, Inc., Municipal Airport, Jackson Heights, N. Y.

**Strom, Gordon H.**, instructor in aeronautical engineering, College of Engineering, New York University, New York City.

**Whitehead, Mark A.**, promotion engineer, American Smelting & Refining Co., Barber, N. J.

#### **Milwaukee Section**

**Brown, Hugh Stewart**, chief engineer, Briggs & Stratton Corp., Milwaukee.

**Rend, John F.**, representative, B. F. Goodrich Co., Milwaukee.

**Tammen, Harold C.**, engineer, Waukesha Motor Co., Waukesha, Wis.

#### **New England Section**

**Brown, Warren Phillip**, draftsman, General Electric Co., Lynn, Mass.

**Rogowski, Augustus R.**, assistant professor of aeronautical engineering, Massachusetts Institute of Technology, Cambridge, Mass.

#### **Northern California Section**

**Hultberg, Alfred E.**, assistant technical editor, Compco Publications, Oakland, Calif.

#### **Northwest Section**

**Clark, W. R.**, shop foreman, North Coast Transportation Co., Seattle, Wash.

**Higgins, Elliott B.**, sales engineer, New Departure, division of General Motors Corp., Seattle, Wash.

**Pedley, Robert M.**, mechanical expert, Westinghouse Air Brake Co., Seattle, Wash.

#### **Oregon Section**

**Brennan, Wallace**, inspector training, CCC Motor Repair Division, Salem, Oregon.

#### **Philadelphia Section**

**Bartlett, H. B.**, sales engineer, Parish Pressed Steel Co., Reading, Pa.

**Gill, John Jay**, assistant supervisor, process engineers, Fleetwings, Inc., Bristol, Pa.

**Summersgill, E. Hibbard**, research engineer, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

#### **Pittsburgh Section**

**Beatty, Joseph M.**, owner, Joseph M. Beatty, 451 Melwood St., Pittsburgh, Pa.

**Darling, Raymond Arthur**, engineering assistant, Cooper-Bessemer Corp., Grove City, Pa.

#### **St. Louis Section**

**Jackson, Ralph Dean**, mechanical engineer, Busch-Sulzer Bros. Diesel Engine Co., St. Louis, Mo.

#### **Southern California Section**

**Gillette, Waldo A.**, traffic manager, Monolith Portland Cement Co., Los Angeles.

**Seaver, William B.**, research engineer, Ethyl Gasoline Corp., San Bernardino, Calif.

**Sharp, Edward L.**, mechanic arts teacher, Redondo Union High School, Redondo Beach, Calif.

**Stein, Oscar**, laboratory mechanic, Lockheed Aircraft Corp., Burbank, Calif.

**Toben, Bernard E.**, service engineer, International Business Machines Corp., Los Angeles.

**Van Norman, D. M.**, assistant superintendent equipment, Department of Water & Power, Los Angeles City, Los Angeles.

**White, William C.**, research mechanic, Lockheed Aircraft Corp., Burbank, Calif.

**Winkler, Edwin**, engineering draftsman, Douglas Aircraft Co., Inc., El Segundo, Calif.

#### **Southern New England Section**

**Breitman, Milton**, draftsman, Vought-Sikorsky Aircraft, division of United Aircraft Corp., Stratford, Conn.

**Hendy, Frederick C.**, experimental test engineer, Pratt & Whitney Aircraft, division of United Aircraft Corp., East Hartford, Conn.

**Isfeld, T. Willard**, test engineer, Pratt & Whitney Aircraft, division of United Aircraft Corp., East Hartford, Conn.

**McArthur, Warren**, president, Warren McArthur Corp., Bantam, Conn.

#### **Tulsa Group**

**Burrier, Horace E.**, engineering department, North American Aviation, Inc., Dallas, Texas.

**Chitwood, J. Vern**, field representative engineer, Fram Corp., East Providence, R. I. Mail: 1533 N. W. 32nd St., Oklahoma City, Okla.

#### **Washington Section**

**Bobrowsky, Alfred R.**, assistant mechanical engineer, Langley Memorial Aeronautical Laboratory, Langley Field, Va.

**Jeffrey, Robert E., Jr., Lt.**, Ordnance Department, U. S. Army, Washington, D. C.

#### **Outside of Section Territory**

**Dalton, Kenneth W.**, Captain, Company "B" 58th QM Regiment, Fort Richardson, Anchorage, Alaska.

**Hite, William N., Lt.**, U. S. Army, Air Corps, Advanced Flying School, Luke Field, Ariz.

**Munn, Rogers G.**, assistant chief inspector, Federal Security Agency, CCC Motor Repair Division, Denver, Colo.

**Murphy, Thomas Edward**, instructor, University of Minnesota, Minneapolis, Minn.

**Ramsey, Maurice R.**, purchasing agent, Continental Motors Corp., Muskegon, Mich.

**Rollo, J. Curwen**, senior draftsman, Clark Ruse Aircraft Ltd., Dartmouth, N. S., Canada.

**Rubly, William A.**, Ensign, U. S. Navy, U. S. Naval Air Station, Pensacola, Fla.

**Taylor, Laurens A.**, electrical engineer, General Electric Co., Schenectady, N. Y.

#### **Foreign**

**Arnott, David Dundas**, development engineer, Rotol Airscrews Ltd., Gloucester, England.

**Ruiz, Andres Lastiri**, equipment engineer, Direccion Nacional de Vialidad, Buenos Aires, Argentina, S. A.

**Slade, Marcus McKellar**, service representative, General Motors India, Ltd., Bombay, India.

**Taylor, George Herbert Kenneth**, works manager and director, Thomson & Taylor (Brooklands) Ltd., Weybridge, Surrey, England.

**Thomson, Kenneth John**, managing director, Thomson & Taylor (Brooklands) Ltd., Weybridge, Surrey, England.

**van Heeckeren, William J.**, Baron, research engineer, N. V. Philips' Gloeilampenfabrieken, Eindhoven, The Netherlands.

# Aircraft Engineering

FOUNDED 1929

The Technical and Scientific  
Aeronautical Monthly

Edited by

*Lt.-Col. W. Lockwood Marsh,  
M.S.A.E., F.R.Ae.S., F.I.Ae.S.*

Single Copies: 50 cents  
post free

Ordinary Subscription:  
\$5.25 per annum, post free

During the War, a special  
feature is being  
made of reproductions  
and translations from  
the Foreign Technical  
Press.

**BUNHILL PUBLICATIONS  
LIMITED**

12 Bloomsbury Square  
London . . . W.C.1  
ENGLAND



er,  
if,  
er,  
lo

n,

n-  
os

n-  
&

c,

n,  
o,

i-  
ft

at

n

l,

x

t

n

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-

-